

VERDICT™

User Manual

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IMPORTANT:

Before operating or maintaining this unit, please read this manual carefully paying extra attention to the safety warnings and precautions.

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Safety Information

For your own safety and the safety of others, and to prevent damage to the equipment and vehicles upon which it is used, it is important that the accompanying *Important Safety Instructions* be read and understood by all persons operating, or coming into contact with, the equipment. We suggest you store a copy near the unit in sight of the operator.

This product is intended for use by properly trained and skilled professional automotive technicians. The safety messages presented throughout this manual are reminders to the operator to exercise extreme care when using this test instrument.

There are many variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. Because of the vast number of test applications and variations in the products that can be tested with this instrument, we cannot possibly anticipate or provide advice or safety messages to cover every situation. It is the automotive technician's responsibility to be knowledgeable of the system being tested. It is essential to use proper service methods and test procedures. It is important to perform tests in an appropriate and acceptable manner that does not endanger your safety, the safety of others in the work area, the equipment being used, or the vehicle being tested.

It is assumed that the operator has a thorough understanding of vehicle systems before using this product. Understanding of these system principles and operating theories is necessary for competent, safe and accurate use of this instrument.

Before using the equipment, always refer to and follow the safety messages and applicable test procedures provided by the manufacturer of the vehicle or equipment being tested. Use the equipment only as described in this manual.

Read, understand and follow all safety messages and instructions in this manual, the accompanying safety manual, and on the test equipment.

Safety Message Conventions

Safety messages are provided to help prevent personal injury and equipment damage. All safety messages are introduced by a signal word indicating the hazard level.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury to the operator or to bystanders.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to the operator or to bystanders.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury to the operator or to bystanders.

Safety messages contain three different type styles.

- Normal type states the hazard.
- **Bold type states how to avoid the hazard.**
- *Italic type states the possible consequences of not avoiding the hazard.*

An icon, when present, gives a graphical description of the potential hazard.

Example:



Risk of unexpected vehicle movement.

- **Block drive wheels before performing a test with engine running.**
A moving vehicle can cause injury.

Important Safety Instructions

For a complete list of safety messages, refer to the accompanying safety manual.

SAVE THESE INSTRUCTIONS

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This manual contains tool usage instructions.

Some of the illustrations shown in this manual may contain modules and optional equipment that are not included on your system. Contact your sales representative for availability of other modules and optional equipment.

1.1 Conventions

The following conventions are used.

1.1.1 Bold Text

Bold emphasis is used in procedures to highlight selectable items such as buttons and menu options.

Example:

- Press the **OK** button.

1.1.2 Symbols

Different types of arrows are used.

The “greater than” arrow (>) indicates an abbreviated set of selection instructions.

Example:

- Select **Utilities > Tool Setup > Date**.

The example statement abbreviates the following procedure:

1. Navigate to the **Utilities** screen.
2. Highlight the **Tool Setup** submenu.
3. Highlight the **Date** option from the submenu.
4. Press **OK** to confirm the selection.

The solid arrows (◀, ▶, ▼, ▲) are navigational instructions referring to the four directions of the directional arrow keys.

Example:

- Press the down ▼ arrow.

1.1.3 Terminology

The term “select” means highlighting a button or menu item and pressing the **Accept**, **OK**, **Yes**, or other similar button to confirm the selection.

Example:

- Select **Reset**.

The above statement abbreviates the following procedure:

1. Navigate to and highlight the **Reset** selection.
2. Press the **OK**, or similar, button.

1.1.4 Notes and Important Messages

The following messages are used.

Notes

A NOTE provides helpful information such as additional explanations, tips, and comments.

Example:



NOTE:

For additional information refer to...

Important

IMPORTANT indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

Example:

IMPORTANT:

Do not disconnect the data cable while the Scanner is communicating with the ECM.

1.1.5 Procedures

An arrow icon indicates a procedure.

Example:

**To change screen views:**

1. Select the **View button**.
The dropdown menu displays.
2. Select an option from the menu.
The screen layout changes to the format selected.

The VERDICT™ Diagnostic Platform is a specialized personal automotive diagnostic solution that combines information with test instrumentation to help you diagnose symptoms, codes, and complaints quickly and efficiently. There are three main components to the VERDICT system:

- "D7 Display Device"—the central processor and monitor for the system
- "S3 Scanner Module"—the device for accessing vehicle data
- "M2 Data Acquisition Device"—the device for performing meter and lab scope tests

This manual describes the construction and operation of these three devices and how they work together to deliver diagnostic solutions.

2.1 D7 Display Device

2.1.1 Functional Description



- 1— Audio Speaker
- 2— Power Indicator LED (light emitting diode)
- 3— Microphone
- 4— Hard Drive Activity LED
- 5— Directional Buttons; left (◀), right (▶), up (▼), down (▲)
- 6— Stylus lanyard anchor post
- 7— S Button (special functions)
- 8— Enter Button
- 9— Camera (shutter) Button
- 10— Virtual Keyboard Button
- 11— Brightness Button
- 12— Power Button

Figure 2-1 Model D7 front view

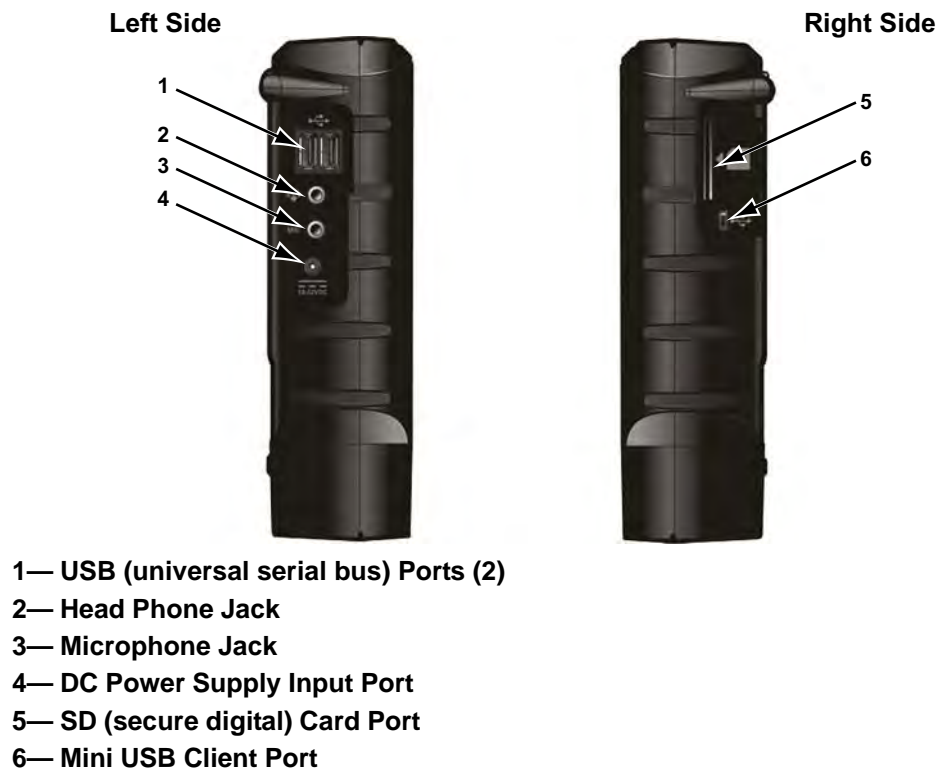


Figure 2-2 Model D7 side views

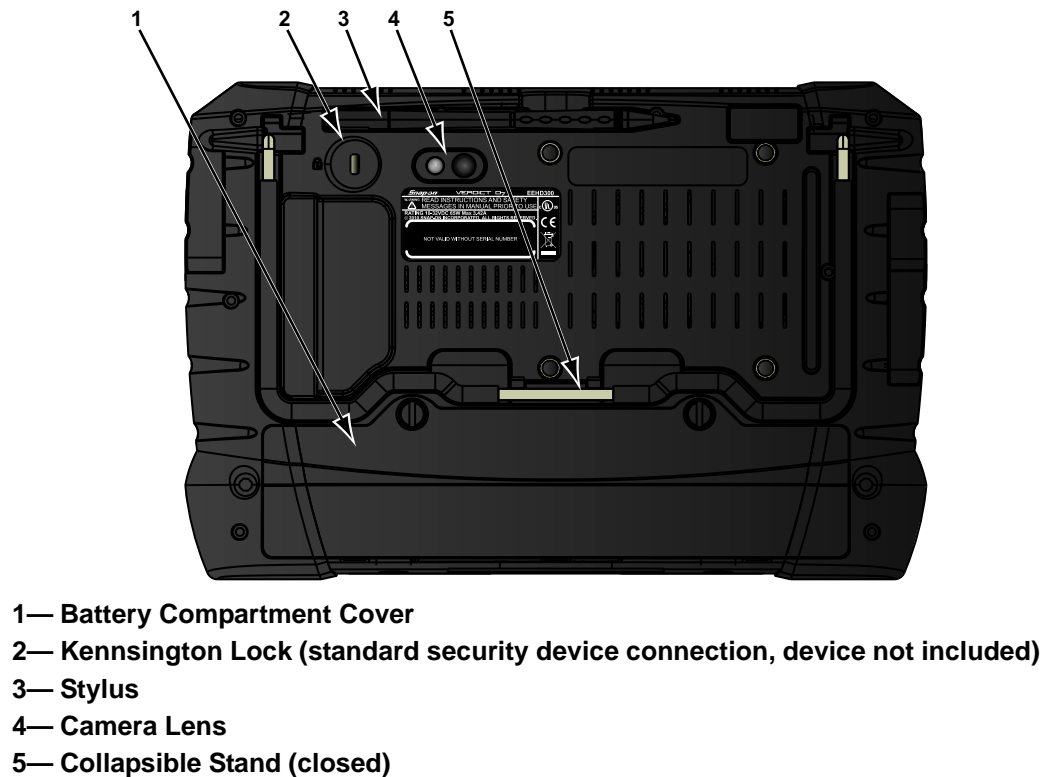


Figure 2-3 Model D7 back view

2.1.2 Technical Specifications

Processor:

Intel Atom

Operating System

Microsoft Windows Embedded Standard SP3

Touch Screen

Resistive Touch Panel

Display:

7 inch diagonal, LCD TFT

1024 x 600 resolution SWVGA

16 bit color

Battery:

Lithium Ion Smart Battery Pack

Approximately 3.5 hour run time

Approximately 3 hour charge time, unit not operating

Approximately 4 hour charge time, unit operating

DC Jack Operating Voltage

10V to 32V DC

Communications:

802.11 b/g/n Wireless

Bluetooth 2.0 Class 1

Dimensions:

Width:

9.9 inches

252 mm

Height:

6.8 inches

173 mm

Depth:

1.8 inches

46 mm

Weight (including battery):

2.9 lbs.

1.32 kg

Operating Temperature Range (ambient):

At 0 to 90% relative humidity (non-condensing)

32 to 113°F

0 to 45°C

Storage Temperature (ambient):

At 0 to 70% relative humidity (non-condensing)

–4 to 140°F

–20 to 60°C

Environmental Conditions:

This product is intended for indoor use only

This product is rated for Pollution Degree 2 (normal conditions)

Power Supply:

Supply Rating; 19 VDC. 3.42A

2.1.3 Power Sources

Your Display Device can receive power from any of the following sources:

- "Internal Battery Pack"
- "AC/DC Power Supply"
- "Vehicle Power"
- "Docking Cradle (Optional)"

Internal Battery Pack

The display unit can be powered from the internal rechargeable battery. A fully charged standard battery provides sufficient power for about 3.5 hours of continuous operation. An optional high-capacity battery that provides 6 hours of operation is available. A LED on the front of the unit indicates the battery state of charge.

AC/DC Power Supply

The display unit can be powered from a wall socket using the AC/DC power supply and power cord. The AC/DC power supply also powers the internal battery pack charging process.

Vehicle Power

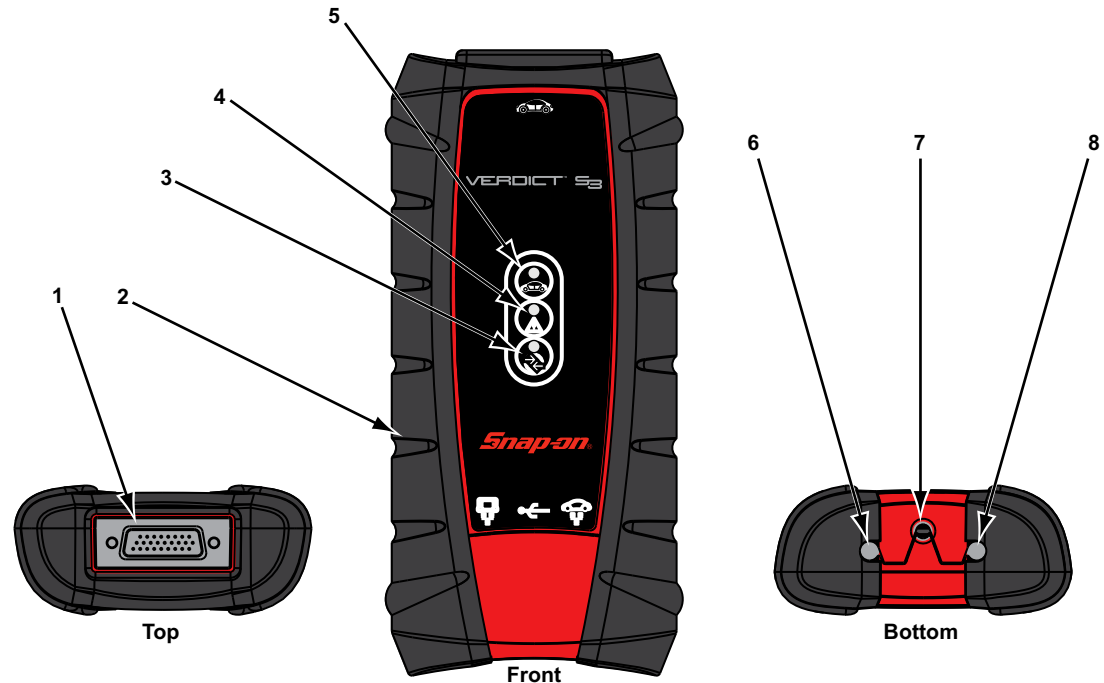
The display unit can be powered from a cigarette lighter or other suitable power port on the test vehicle through a direct cable connection. The vehicle power cable connects to the DC power supply port on the left side of the display unit.

Docking Cradle (Optional)

The display unit can be powered and operated when installed on the optional docking cradle. The docking cradle also powers the internal battery pack charging process and allows USB connectivity for attaching peripherals. Contact your sales representative for additional details.

2.2 S3 Scanner Module

2.2.1 Functional description



- 1— Data cable connector
- 2— Memory card port (remove protective hand grip for access)
- 3— Bluetooth LED (green)
- 4— Communication issue LED (red)
- 5— Vehicle power LED (green)
- 6— Ethernet port (remove protective hand grip for access)
- 7— Universal serial bus (USB) port (remove protective hand grip for access)
- 8— Ethernet port (remove protective hand grip for access)

Figure 2-4 Model S3 Scanner Module

Wireless Communication

The S3 Scanner Module is a wireless communications device that transmits vehicle data to the VERDICT display device without a physical connection. The working range of the transmitter is about 30 feet (9.14 m). A signal lost due to moving out of range automatically restores itself when the display unit is brought closer to the Scanner module. The Scanner sounds a tone and the Display Device shows a warning message when the signal is lost.

2.2.2 Technical Specifications

Communications:

Bluetooth 2.0 Class 1

Dimensions:

Length:

8.04 inches

204.3 mm

Height:

3.82 inches

97 mm

Depth:

1.66 inches

42.1 mm

Weight (including protective hand grip):

0.9 lbs.

0.408 kg

Operating Temperature Range (ambient):

At 0 to 90% relative humidity (non-condensing)

32 to 113°F

0 to 45°C

Storage Temperature (ambient):

At 0 to 70% relative humidity (non-condensing)

–4 to 140°F

–20 to 60°C

Environmental Conditions:

This product is intended for indoor use only

This product is rated for Pollution Degree 2 (normal conditions)

2.2.3 Power Sources

The Scanner Module operates on 12-volt vehicle power, which it receives through the data cable connector. The unit powers on whenever it is connected to an OBD-II compliant data link connector (DLC). For non OBD-II compliant vehicles, the unit can be powered from a cigarette lighter or other suitable power port on the test vehicle using the auxiliary power cable.

2.3 M2 Data Acquisition Device

2.3.1 Functional Description



- 1— DC Power Supply Input Port
- 2— Color Graphic Display Screen
- 3— Soft Keys for Selecting Additional Functions
- 4— Rotary Switch for Selecting Primary Functions
- 5— Common (Ground) Lead Input Port
- 6— Channel 1 (Red) Lead Input Port
- 7— Channel 2 (Green) Lead Input Port

Figure 2-5 Model M2 Data Acquisition Module

Wireless Communication

The VERDICT M2 is digital graphing multimeter and wireless communications device. The unit can be used as a stand-alone meter, or configured to transmit vehicle data to the D7 Display Device without a physical connection. The working range of the transmitter is about 30 feet (9.14 m). A signal lost due to moving out of range automatically restores itself when the display unit is brought closer to the M2 meter. The VERDICT M2 sounds a tone and the Display Device shows a warning message when the signal is lost.

2.3.2 Technical Specifications

Display:

Color graphical display

Battery Pack:

4 1.2V Ni-Mh (nickel-metal hydride)

Dimensions:

Height:

9.125 inches

231.8 mm

Width:

4.25 inches

107.9 mm

Depth:

2.00 inches

50.8 mm

Weight (including battery):

1.9 lbs.

0.86 kg

Agency Approvals:**IEC 61010-1 Over Voltage**

CAT III—1000 VAC/DC

CAT IV—600 VAC/DC

Pollution Degree 2

UL Listed 61010-1:

CAT II 750 VAC, 1000 VDC

CAT III 600 VAC/DC

2.3.3 Power Sources

The Data Acquisition Device comes with a rechargeable battery pack, which is already installed in the unit. Simply turn on the unit and observe the battery icon on the display to determine the battery pack state of charge. The AC/DC Power Supply (included) provides power from a wall socket to recharge the battery pack, or to power the unit if the battery pack charge is low.

Internal Battery Pack

The data acquisition unit is powered from the internal rechargeable battery. An icon in the upper right-hand corner of the display screen indicates the battery state of charge.

AC/DC Power Supply

An AC/DC Wall Adapter for charging the internal battery of the M2 Data Acquisition Device is also provided. The jack that connects the adapter to the M2 unit is longer than the jack that is used for the display device.

Make sure the VERDICT Display Device has a charged battery or is connected to an AC power supply (see "[Power Sources](#)," on page 8). It is highly recommended to back up personal and saved data to a USB mass storage device on a regular basis to prevent loss in the event of system corruption or hard disk drive failure.

3.1 Powering Up

Press the Display Device Power button to switch the unit on. The system boots up, then opens the VERDICT Home screen ([Figure 3-1](#)).



Figure 3-1 Sample VERDICT Home screen

3.1.1 Module Buttons

The Module buttons configure the VERDICT for the type of test to be performed. The table below gives brief descriptions of the available Module buttons, which operations are available depends upon the individual configuration of your VERDICT system.

Table 3-1 *Module buttons*







Name	Button	Description
Scanner		Configures the unit to operate as a scan tool. See "S3 Scanner Operations," on page 22.
OBD Direct		Allows you to perform generic OBD-II system tests without identifying the specific vehicle. See "OBD Direct Operations," on page 50.
Component Test		Opens a diagnostic database of specific tests for the identified vehicle. See "Component Test Operations," on page 58.
Scope Multimeter		Configures the unit to operate as a lab scope, graphing multimeter, or digital multimeter. See "Scope Multimeter Operations," on page 89.
Information		Provides the information needed to make repairs once you have made your diagnosis. The linked program varies by region. See "Information Operations," on page 107.
Help		Opens the on-line help for the system. See "Help Operations," on page 108.
System Settings		Establishes and manages wireless connections to peripheral devices, such as the Scanner module and the Data Acquisition Device. See "System Settings Operations," on page 111.
Vehicle History		Identifies the test vehicle and organizes and manages work in progress and service records. See "Vehicle History Operations," on page 121.
Data Manager		Opens the organization system for saved data files. See "Data Manager Operations," on page 115.
Exit		Closes the VERDICT diagnostic Platform software and returns the display to the Windows desktop.

Use the stylus or your finger tip to select from the Module buttons.

3.1.2 VERDICT Toolbar

Operation of the buttons located on the VERDICT toolbar are described in the table below:

Table 3-2 *Module buttons*

Name	Button	Description
Home		Touching this button returns you to the VERDICT Home screen from any test.
Windows Toolbar		Touching this button opens and closes the standard Windows toolbars at the top and bottom of the screen.
Menu		Touching this button opens a menu that provides information on the screen being viewed.
Change Vehicle		The currently identified vehicle is shown to the right of the buttons, touching allows you to change the identified test vehicle.
View Record		Touching the button opens an editable worksheet of vehicle records.
Hardware Status		Indicates the wireless connectivity status of the Scanner module and the Data Acquisition Device.

Menu Button Options

The Menu button on the VERDICT Toolbar at the base of the display screen opens a list of basic operations and features. Menu options vary by module and may include:

- **Safety Information**—opens the Important Safety Instructions document, which should be read and understood prior to using the VERDICT Diagnostic Platform.
- **File**—allows you to print or save the data being viewed.
- **Edit**—allows you to configure alarms when viewing Scanner data.
- **Tools**—allows you to perform certain maintenance operations and adjust tool settings.
- **Help**—allows you to view supporting documentation.

Selecting a menu item opens a submenu of choices, and some submenus also open an additional menu. A right arrowhead (►) indicates additional choices are available. Touch an item to select it.

File

Use to print or save a copy of the data currently being viewed. Selecting opens a submenu:

- **Save**—available from the Scanner module, opens an additional submenu with these options:
 - **Screenshot**—saves a graphic image of the current screen
 - **Collected Data**—saves a recording of all the data currently in the buffer plus the number of frames designated after the trigger event (see "[Properties](#)," on [page 45](#)).

- **Print**—available from the Scanner module, opens an additional submenu with these options:
 - **Screen**—sends the current screen image to a printer.
 - **Troubleshooter**—prints the full text of the troubleshooter topic shown in the main body.
- **Print Article**—available from the Component Test module, has one of the following results:
 - If VERDICT is connected to a printer, the file is sent to the printer.
 - If VERDICT is not connected to a printer, the article is saved as a .xps file, which can be retrieved, moved, or copied and printed at a later time.

Selecting a print option opens a standard Windows Print dialog box, which allows you to print or save the file.

Edit

This Scanner module option performs the same function as the Alarms button on the Scanner Toolbar. For more information refer to ["Alarms," on page 46](#)).

Tools

This Scanner module option allows you to adjust tool settings to your personal preferences. Selecting Tools opens a submenu of the following sections.

Graph Properties

Selecting opens the General Graph Properties dialog box, which is similar what is available from the Properties button on the Scanner Toolbar (see ["Properties," on page 45](#)). Changes made here apply to all of the graphs. General graph options allow you to:

- Change the background and plot colors of the graphs.
- Switch graph grid lines on and off.
- Adjust how much data is captured after a triggering event.
- Adjust the sweep time of the graphs.

Units Setup

Selecting opens a dialog box that allows you to choose between US customary or metric units of measure for temperature, vehicle speed, air pressure and other pressure readings.



To change the units setup:

1. From the VERDICT toolbar select **Tools > Units Setup**.
The Measurement Units Setup dialog box opens ([Figure 3-2](#)).
2. Use the dropdown menus to select the desired value for each item.
3. Tap **Accept** to close the dialog box and apply the changes.

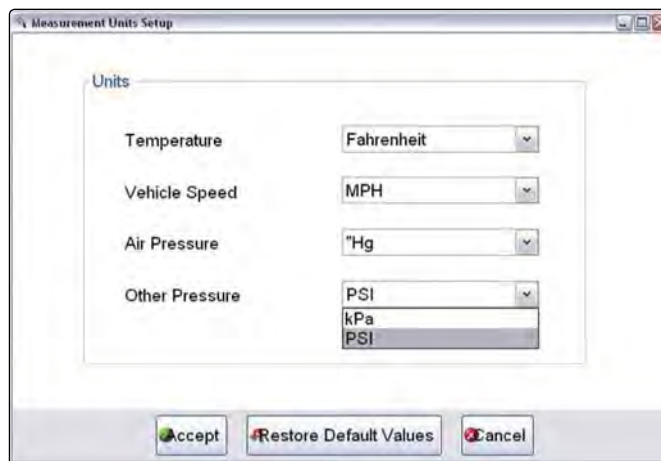


Figure 3-2 Sample view options

Table 3-3 Scan tool units of measurement—defaults and options

Setting	Default	Option
Temperature	degrees Celsius (°C)	degrees Fahrenheit (°F)
Air Pressure (including manifold pressure)	kilopascal (kPa)	inches of mercury (\"Hg)
Vehicle Speed	kilometers per hour (KPH)	miles per hour (MPH)
Other Pressure	kilopascal (kPa)	pounds per square inch (PSI)

Download Firmware

This option is used to update the firmware on your VERDICT unit. For firmware information, contact your sales representative or Customer Care. While downloading the firmware, do not interrupt the download process. Connection interruption may cause damage to the VERDICT unit.



NOTE:

It is recommended to connect the VERDICT to an AC power source when downloading firmware.

Display BEN

This option shows the BEN of the currently identified vehicle in the Scanner toolbar. The BEN is a unique identifier that is used internally for data coordination and communication.

Help

A variety of utilities and additional resources are available through the Help menu. Menu options vary by module and may include:

- User Manual
- Version Info
- Activation Status
- User's Manuals
- About Component Test
- About Scanner
- Shop Information

User Manual

This option opens this document, which provides overall navigation and operation information for the VERDICT Diagnostic Platform.

Version Info

This option opens a window showing the version of the VERDICT software and a copy of the Software License Agreement ([Figure 3-3](#)). Tap **OK** to close the window.



Figure 3-3 Sample software version screen

Activation Status

This option opens a dialog box with version and licensing details for the VERDICT system, and activation status for the Display device and all other modules.

User's Manuals

This Scanner module option opens a submenu of support documentation, such as vehicle communication software manuals. These manuals provide connection and test information for specific vehicles. Selecting a menu item opens a printable PDF version of the document in a separate window.

About Component Test

This option opens a dialog box that contains software version and details, copyright data, and other specific details about the Component Test module.

About Scanner

This option opens a dialog box that contains software version and details, copyright data, and other specific details about the Scanner module.

Shop Information

This Vehicle History option that allows you to add personalized shop information that can be included on printed data files. Selecting opens a form that can be filled in using the virtual keyboard. Select OK when done and the information is saved.

3.1.3 Windows Toolbar

This is the standard Windows toolbar. Your VERDICT unit is a fully functional personal computer based on the Windows Embedded Standard operating system. Refer to Microsoft documentation for additional information.

3.2 Powering Down

All vehicle communication must be terminated before shutting down the VERDICT unit. A warning message displays if you attempt to shut down while the Scanner is communicating with the vehicle. Forcing a shut down while communicating may lead to ECM problems on some vehicles. Exit the Scanner module before powering down.



To power down the VERDICT unit:

1. Navigate to the VERDICT Home screen.
2. Select the **Exit** button.
3. From the Windows desktop, open the Windows **Start** menu.
4. Select **Turn Off Computer**.
5. Select **Turn Off** in the dialog box.

The open programs close and the power switches off.

3.2.1 Emergency Shutdown

In case of emergency, press and hold the Power button to force a shutdown.

This chapter discusses how to use the hardware controls and features for the VERDICT Display Device and Data Acquisition Module. There are no external controls on the Scanner Module, it can only be operated by a separate device.

4.1 D7 Display Device Controls, and Features








The external controls on the display device are simple because most operations are controlled through the touch screen. Touch screen navigation is menu driven, which allows you to quickly locate the test, procedure, or data that you need through a series of choices and questions. Detailed descriptions of the menu structures are found in the chapters for the various modules.

The following sections describe the external controls and features of the display device.

4.1.1 Control Buttons

Name and location of control buttons:

Table 4-1 *Display Device control buttons*

Name	Button	Description
S Button		A function button that provides a shortcut for capturing a screen image.
Directional Buttons		Moves the cursor or highlight on the display screen up, down, right, or left.
Enter Button		Selects a highlighted item or returns the display to the previous screen.
Camera Button		Operates the built-in camera. Press once to open the application. The button then acts as the shutter to take a photograph of what is visible on the screen.
Keyboard Button		Opens or closes the virtual keyboard.
Brightness Button		Increases the screen backlighting in seven incremental steps.
Power Button		Turns the unit on and off.

All other tool operations are controlled through the touch screen.

**To use the camera:**

1. Press the **Camera** button.
The camera screen opens and the button now becomes the shutter.
2. Focus the image to be captured in the view finder.
3. Press the **Camera** button.
The view finder now shows the captured picture.
4. Select **OK** to save the image, or **Delete** to delete it.
The view finder is live and the Camera button is the shutter, repeat steps 2, 3, and 4 to take additional pictures.
5. Select **Exit** from the live view to close the camera application.

4.1.2 LEDs

There are two light-emitting diodes (LEDs) on the front face of the device:

- Power Indicator LED—this device uses three colors to show the battery and power status as follows:
 - Green indicates a either a battery with a full, or nearly full, charge or DC power
 - Orange indicates a battery that is charging. An orange LED that fades on and off at three second intervals indicates the unit is in Standby mode.
 - Red indicates a low battery (15% of capacity or less).
- Hard Drive Activity LED—illuminates when the central processing unit (CPU) is reading or writing to the hard disk drive (HDD).

4.1.3 The Stand

The built-in stand extends from the back of the unit to allow hands-free viewing. The stand clips into the unit for storage and pivots out so the display is at a 35 degree angle when in use.

4.2 M2 Data Acquisition Device Controls and Features

There are two sets of controls for the M2 Data Acquisition Device:

- Rotary Selector Switch—establishes the primary operation of the unit
- Soft Keys—select additional functions, which vary depending upon the position of the Rotary Selector Switch

The following sections describe the external controls and features of the M2 unit.

4.2.1 Rotary Selector Switch

Turning the Rotary Selector Switch determines the primary function of the M2 unit.

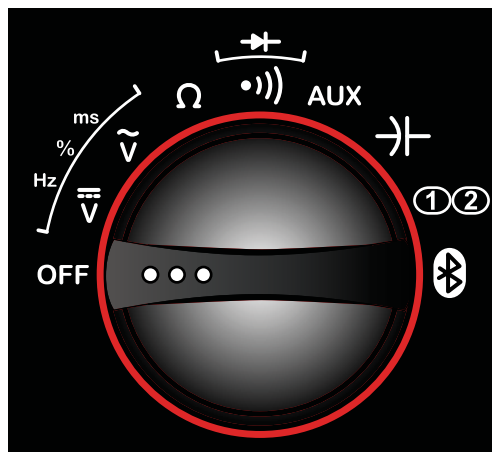


Figure 4-1 Sample Rotary Selector Switch

The available functions are represented by graphic icons on the face of the tool. Descriptions of the functions are given in the following table:

Table 4-2 Data Acquisition Device rotary switch settings

Function	Icon	Description
Off	OFF	Switches power to the M2 unit off. The switch should be in this position whenever the tool is not being used to prevent battery drain.
Volts DC	$\overline{\text{V}}$	Measures direct current (DC) voltages within a range of zero to 600 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Volts AC	$\sim \text{V}$	Measures alternating current (AC) voltages within a range of zero to 1000 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Resistance	Ω	Measures the DC resistance to current in ohms in a range of zero to open circuit (infinite).
Continuity/ Diode Check		Performs dual tests; circuit continuity and diode test (forward drop). The "S" (special function) soft key switches between the two tests.
Auxiliary	AUX	Performs three auxiliary tests; current (amperes), pressure, and temperature. The "S" (special functions) soft key switches between the three tests. Pre-approved sensors must be used in order to take valid measurements.
Capacitance		Measures capacitance in nanofarad (nF), millifarad (mF), and microfarad (μF).
Oscilloscope (Waveform Viewer)		Configures the M2 unit to perform as one or two channel oscilloscope, or waveform viewer.
Remote Functions		Configures the M2 unit to be operated through the Display Device. Readings are also shown on the Display Device screen. All of the controls on the front panel of the M2 unit become inoperative when the rotary switch is in this position.

4.2.2 Soft Keys

The eight soft keys located above the rotary dial on the M2 unit are used to initiate a variety of additional functions while performing meter tests. The functionality of the soft keys varies according to what type of tests are being performed, as determined by the position of the rotary switch. Some of the soft keys do not function for certain test modes. Refer to ["M2 Data Acquisition Device," on page 67](#) for additional information.

In general, a short or momentary push of a soft key activates the assigned function, a long push returns to the normal display.

The Scanner allows you to establish a data link to the electronic control systems of the vehicle being serviced to retrieve diagnostic trouble codes (DTCs) view live data parameters, and perform tests. The Scanner can access the electronic control module (ECM) for various vehicle control systems such as engine, transmission, antilock brake system (ABS) and more.

Scanner testing requires connecting the VERDICT Diagnostic Platform to the test vehicle using the data cable and test adapters. On screen instructions tell you how to connect the Scanner, additional connection information can be found in the appropriate vehicle communication software manual for the test vehicle, which is available through the Help menu.

The S3 Scanner Module is J2534 compliant and capable of flash programming vehicle ECMs.

5.1 Getting Started

Prior to its first use, the Scanner Module must be synchronized with the VERDICT Display Device to establish a wireless communication link. Refer to [“Pairing the S3 Scanner Module” on page 112](#) for details.

A demonstration program allows you to become familiar with Scanner operations and testing without being connected to an actual vehicle.

5.1.1 The Demonstration Program

The Scanner module demonstration program allows you to become familiar with many of the test capabilities without connecting to a vehicle. Sample data and mock test results help you learn the menus and basic operations.

The Scanner module must be synchronized with the display device to use the demonstration program. See [“Pairing the S3 Scanner Module” on page 112](#) for details. Both the Scanner module and the display device must be powered on.



To start the demonstration program:

1. From the VERDICT Home screen, tap the **Scanner** icon.
The manufacturer menu displays. This menu lists includes all makes that are covered by any of the VERDICT modules, not just those for which Scanner information is available. There is a Demonstration button that launches the program is also included in the list.
2. Tap the **Demonstration** button.

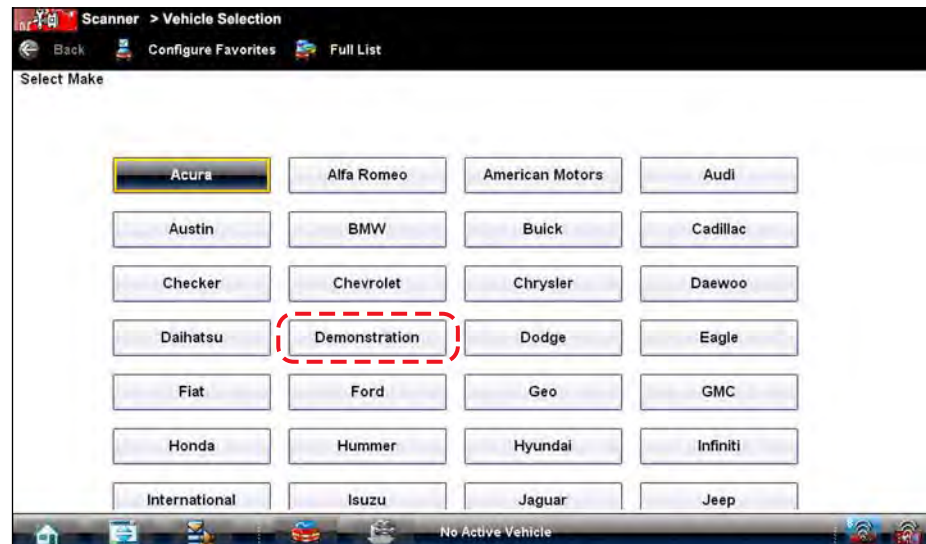


Figure 5-1 Sample demonstration selection

A screen with two choices now displays:

- US Domestic—contains actual data captured while driving a 2001 Chevrolet Tahoe. Look for the throttle position (TP) sensor dropout while analyzing the data in Graphing mode.
 - OBD Training Mode—provides simulated data for an OBD-II/EOBD vehicle that allows you to access any of the standard functions.
3. Select either option and a confirmation message displays.
 4. Select **Ok** to load the selected database.
 5. Follow the on-screen instructions and select as needed until the Systems menu displays.
 6. Select from any of the systems listed, then select from the submenus.

IMPORTANT:

Do not connect a vehicle to the VERUS unit while in the Demonstration mode.

5.1.2 Disconnecting the VERDICT Unit From a Vehicle

When disconnecting the VERDICT unit from the vehicle, make sure the Scanner software is not communicating with the vehicle.



To exit Scanner and disconnect the VERDICT Unit from a vehicle:

1. From a codes or data display screen, tap the **Exit** button on the upper toolbar.



Figure 5-2 Sample upper toolbar Exit button

The screen goes to the codes or data menu.

2. Tap the **Back** button on the upper toolbar.



Figure 5-3 Sample upper toolbar Back button

The screen goes to the system menu.

3. Tap the **Back** button on the upper toolbar.
A “stopping communication” briefly displays followed by the systems menu.
4. Tap the **Change Vehicle** button on the VERDICT toolbar.



Figure 5-4 Sample VERDICT toolbar Change Vehicle button

The vehicle description on the toolbar should now read “No Active Vehicle”.

5. Tap the **Home** button on the VERDICT toolbar.



Figure 5-5 Sample VERDICT toolbar Home button

The Home screen displays.

6. Disconnect the test adapter from the vehicle connector.



NOTE:

Damage to the electronic control module (ECM) of the vehicle can occur if communication is disrupted. Ensure that the vehicle communication cable is properly connected at all times during testing. Exit testing before removing the test cable or powering down.

5.2 Vehicle Identification

The Scanner information presented is provided by a direct link to the ECM of the vehicle being tested. Therefore, certain attributes of the test vehicle must be entered into the VERDICT unit so that the data displays correctly. Vehicle identification information is carried over if you enter the Scanner module either from the Component Test module or from one of the records stored in the Vehicle History module. However, you may need to enter additional attributes in some instances.

The vehicle identification sequence is menu driven, you simply follow the screen prompts and make a series of choices. Each selection you make advances you to the next screen. A Back button in the upper left corner of the screen returns you to the previous screen. Exact procedures may vary somewhat by vehicle.



To identify a vehicle for Scanner testing:

1. Tap the **Scanner** module button from the Home screen.
A list of manufactures displays ([Figure 5-6](#)).

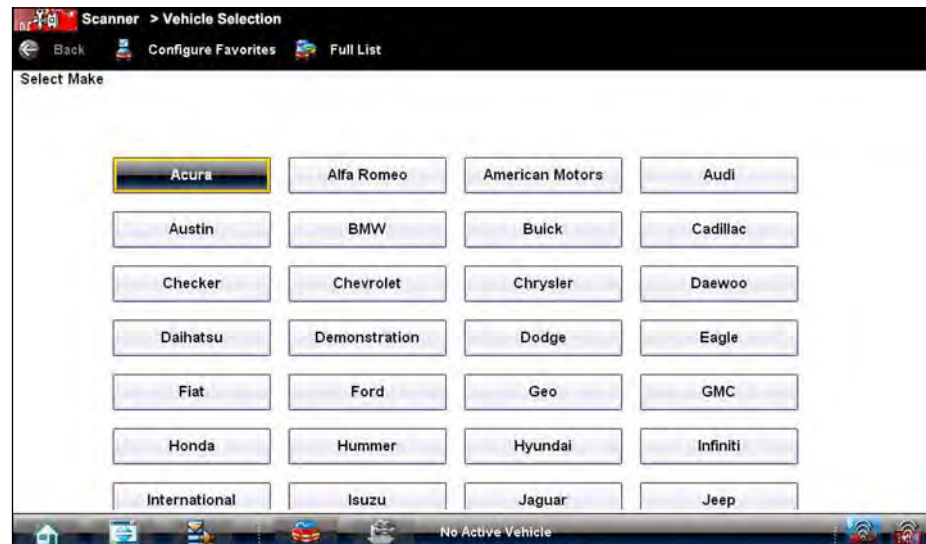


Figure 5-6 Sample manufacturer list

2. Select the manufacturer of the test vehicle from the list.
A model year menu displays.



NOTE:

You can limit the number of manufacturers that appear on the list by selecting Configure Favorites from the toolbar. See ["Creating a Favorites List" on page 58](#) for details.

3. Select the year of the test vehicle from the menu.
A list of vehicle types or models displays. Several selections may be required to identify the vehicle type and model, follow the screen prompts and enter the required information.
A confirmation dialog box displays once all the required data has been entered ([Figure 5-7](#)).

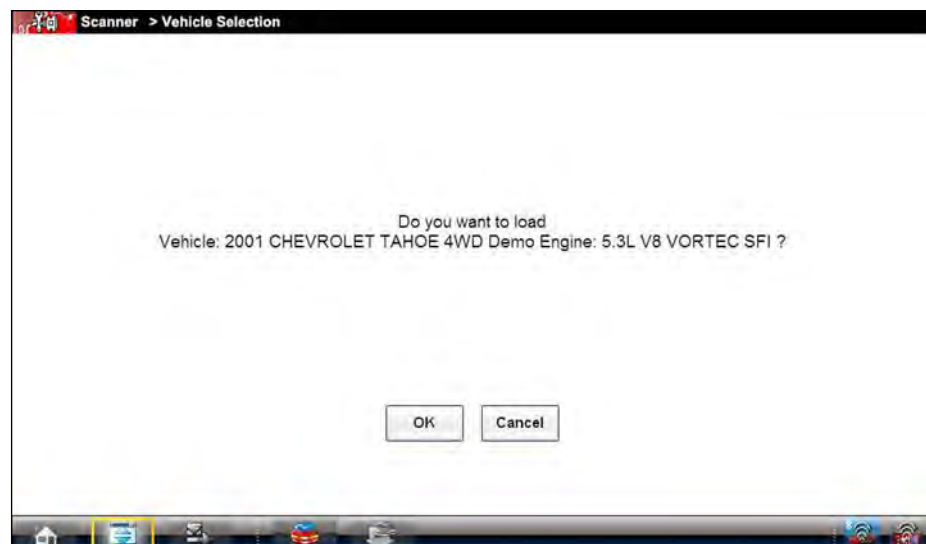


Figure 5-7 Sample confirmation dialog box

4. From the Confirm vehicle details dialog box, select:
 - a. **OK** to continue.
 - b. **Cancel** to return to the engine list.When Yes is selected list of systems available for testing on the identified vehicle displays.
5. Select a test to continue (Figure 5-8).

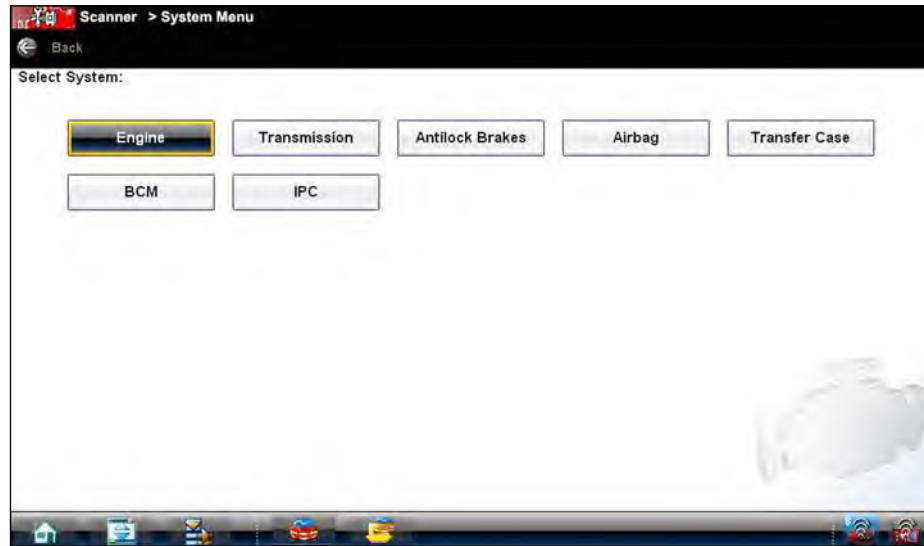


Figure 5-8 Sample available tests list

The identification sequence is now complete, refer to the Operations section that follows for details on how to navigate through the Scanner data and perform tests.



NOTE:

If you return to the Home screen and select Component Test, Information, or another module the vehicle identification entered here is carried over. However, additional information may be needed in some instances.

5.2.1 Alternative Vehicle Identification

Occasionally, you may identify a test vehicle that the Scanner does not recognize, the database does not support, or has some unique characteristics that prevent it from communicating with the Scanner through the normal channels. In these instances, a menu of alternate choices that allow you to establish communication with the vehicle by other means displays. In addition to being able to identify a different manufacturer, the following alternatives are available:

- OBDII/EOBD—allows you to perform generic OBD-II or EOBD tests, see [“OBD Direct Operations” on page 50](#) for additional information.
- System ID Modes—allows you to begin the vehicle identification by first selecting the system to be tested. Selecting opens a menu of manufacturers that support this mode.
- Select by Database—allows you to begin the vehicle identification by first selecting which manufacturer database to load. Selecting opens a menu of available databases.

5.3 Connecting to a Vehicle

Make a selection from the systems available for testing list and instructions for connecting the Scanner to the vehicle with the data cable display on the screen (Figure 5-9).

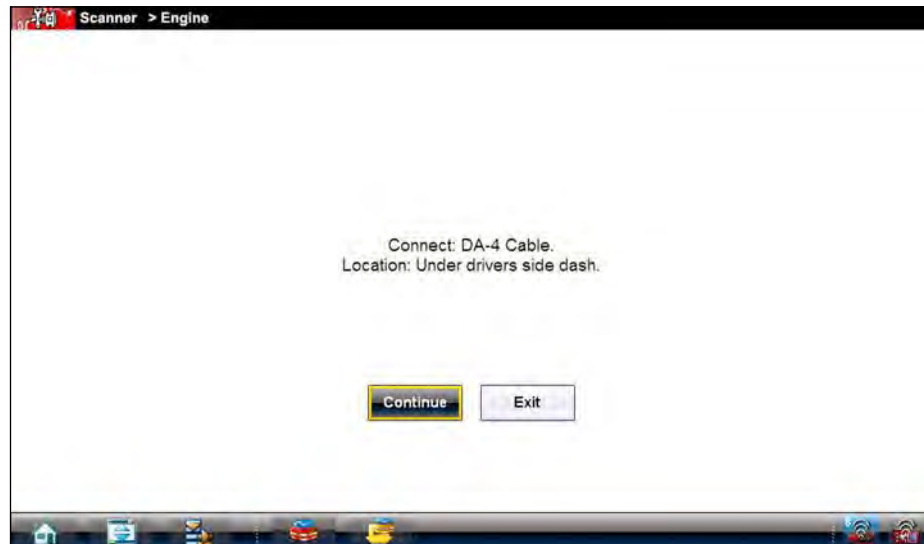


Figure 5-9 Sample vehicle connection message

If an adapter and key are needed, the instructions tell you which ones to use, and also where to locate the vehicle diagnostic connector to perform the selected tests. Refer to the appropriate *Vehicle Communication Software Manual* for additional details.

5.3.1 Cables

One of two data cables, one for OBD-II compliant vehicles and one for non-OBD-II models, are used to connect the S3 Scanner module to the test vehicle. The 26-pin end of either cable attaches to the data cable port on the Scanner module and is secured with two captive screws. The 16-pin end of the OBD-II cable directly plugs into the data link connector (DLC) of the test vehicle. The 15-pin end of the non-OBD-II cable attaches to a cable adapter and is secured with captive screws, the adapter then plugs into the diagnostic connector on the test vehicle.

On-screen instructions on the display device screen tell you which cable, and adapter if needed, to use once a test vehicle has been identified. The screen message also includes the location of the vehicle diagnostic connector that the cable attaches to for testing the selected system.

A replaceable 7.5 amp blade-type fuse is installed in the vehicle connector end of the cable to protect the unit from high circuit voltage and current. A green LED, also on the vehicle connector end of the cable, illuminates whenever there is power supplied to the cable. An LED that fails to illuminate indicates either a problem on the vehicle power circuit or a blown data cable fuse.

All OBD-II vehicles have vehicle battery power (B+) available on the DLC, so the Scanner module should power on as soon as the cable is connected to the vehicle. The auxiliary power cable supplies power for testing non-OBD-II models that do not have B+ on the diagnostic connector. An optional OBD-I Data Cable and adapters are required for testing non-OBD-II models.

The large end of the auxiliary power cable plugs into the vehicle accessory port. The small end of the cable fits into a power port built into the side of the cable adapter. An in-line fuse on the auxiliary cable provides circuit protection.



To connect the data cable to the vehicle:

1. Follow the on-screen instructions for connecting to the vehicle ([Figure 5-9](#)).
2. Once connected, select **Continue**.

The Scanner establishes communication then displays a list of available tests. If the Scanner is unable to establish a communications link, a “no communications” message displays.

3. Select from the available tests to open a submenu of test options.

5.3.2 No Communication Message

When the screen displays a “no communication” message, it means the VERDICT unit and the vehicle control module cannot communicate with each other for some reason.

The following conditions cause a “no communication” message to display:

- The Scanner is unable to establish a communication link with the vehicle.
- You selected a system for testing that the vehicle is not equipped with (such as ABS).
- There is a loose connection.
- There is a blown vehicle fuse.
- There is a wiring fault on the vehicle, or in the data cable or adapter.
- There is a circuit fault in the data cable, Personality Key, or adapter.
- Incorrect vehicle identification was entered.

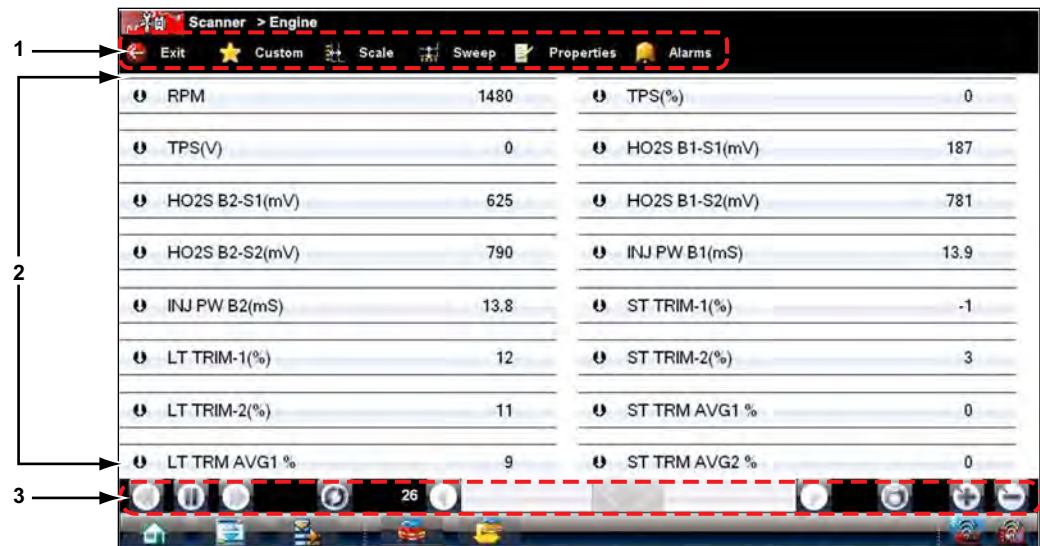
Refer to the Vehicle Communication Software manuals for manufacturer-specific problems.

5.4 Navigation

This section describes how to navigate the Scanner interface and select scanner tests.

5.4.1 Scanner Screen Layout

The Scanner screens typically include three sections ([Figure 5-10](#)):










- 1— Scanner Toolbar
 2— Main Body
 3— Data Buffer Toolbar

Figure 5-10 Scanner module screen layout

Scanner Toolbar

The Scanner toolbar contains a number of buttons that allow you to configure the displayed data and to exit. The table below provides a brief explanation of the Scanner toolbar button operations:

Table 5-1 Scanner toolbar buttons

Name	Button	Description
Exit	 Exit	Closes the current test and returns you to the menu.
Back	 Back	Returns to the previously viewed screen.
Custom	 Custom	Allows you to select which parameters are displayed on the screen.
Scale	 Scale	Switches the scale values, displayed along the left-hand side of the graphs, on and off.
Sweep	 Sweep	Switches the sweep values, displayed at the base of the graphs, on and off.
Properties	 Properties	Allows you to adjust the display characteristics for all of the data screens.
Alarms	 Alarms	Allows you to set an alarm on certain data parameters when the signal goes above or below the alarm setting.

Main Body







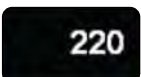




The main body of the screen varies depending on the stage of operation. The main body can show vehicle identification selections, the main menu, test data, instructions, troubleshooting information, controls, and other diagnostic information.

Data Buffer Toolbar

Whenever communication is established with a vehicle, the Scanner continuously records data transmitted by the ECM in the data buffer. The toolbar below the main body of the screen contains the buttons for navigating this buffered data.

Use the toolbar buttons ([Table 5-2](#)) to more precisely navigate the data.

Table 5-2 Data buffer toolbar buttons

Name	Button	Description
Go To Start		Moves to the first frame in the data buffer
Pause		Suspends data capture and changes to show the Play button
Play		Starts or resumes data capture and changes to show the Pause button
Go To End		Moves to the last frame in the data buffer
Clear		Erases data in the data buffer
Step Back		Moves to the previous frame in the data buffer
Frame Counter		Indicates the data buffer frame currently displayed
Step Forward		Moves to the next frame in the data buffer
Snapshot		Arms the VERDICT software to take a snapshot of vehicle data
Zoom In		Increases the sweep of the graph
Zoom Out		Decreased the sweep of the graph

Use the slider in the middle of the toolbar to quickly move through paused data.



Figure 5-11 *Sample data buffer slider*

5.4.2 Screen Messages

Screen messages appear when additional input is needed before proceeding. There are three types of on-screen messages:

- Confirmations
- Warnings
- Errors

Confirmation Messages

Confirmation messages inform you when you are about to perform an action that cannot be reversed or when an action has been initiated and your confirmation is needed to continue.

When a user-response is not required to continue, the message displays briefly before automatically disappearing.

Warning Messages

Warning messages inform you when completing the selected action may result in an irreversible change or loss of data.

Error Messages

Error messages inform you when a system or procedural error has occurred.

Examples of possible errors include:

- A cable is disconnected.
- A peripheral, such as a printer is powered off.

5.4.3 Making Selections

The Scanner software is a menu driven program that presents a series of choices one at a time. As you select from a menu, the next menu in the series displays. Each selection narrows the focus and leads to the desired test. Use your fingertip or the stylus to make menu selections.

5.5 Operations

The Scanner allows you to establish a data link to the electronic control systems of the vehicle being serviced in order to view live data parameters and perform tests. You can use selected functional tests, get troubleshooting tips, and get vehicle-specific trouble codes for various vehicle control systems such as engine, transmission, antilock brake system (ABS) and more.

The Scanner has two main functions:

1. **Scanner**—provides access to Vehicle Communication Software functions such as reading codes, viewing data, and performing functional tests.
2. **Fast-Track Troubleshooter**—provides the diagnostic power of Fast-Track Troubleshooter, a database of experience based information developed by master technicians.

After a system is selected and the Scanner establishes communication with the vehicle, a Scanner Main menu, which lists available tests, displays.



Figure 5-12 Sample Scanner Main menu

Main menu options vary slightly by the year, make, and model of the test vehicle. The main menu may include:

- **Data Display**—displays data parameter information from the vehicle control module. Selecting may open a submenu of viewing options.
- **Codes Menu**—displays diagnostic trouble code (DTC) records from the vehicle control module. Selecting may open a submenu of viewing options.
- **Clear Codes**—erases DTC records and other data from the ECM. This selection is found on a Codes submenu for some models.
- **Functional Tests**—provides specific subsystem and component tests. The tests vary depending on the manufacturer and model.
- **Actuator Tests**—similar to functional tests, checks the operation of certain actuators, such as solenoid valves and relays.
- **Memory Resets**—allows you to reprogram adaptive values for certain components after making repairs. Selecting opens a submenu. These options are found on the Functional Tests Menu for some models.

- **System Tests**—provides specific subsystem testing. Performing these tests is similar to functional tests.
- **Generic Functions**—lets you access certain available Generic OBD II functions from a proprietary menu (1996 and newer vehicles only).
- **Troubleshooter**—provides step-by-step procedures, integrating parameter data and retrieving trouble codes when appropriate, for specific symptoms of the identified vehicle.



To perform a Scanner test

1. **Launch the Scanner**—Tap Scanner on the VERDICT Home screen.
2. **Identify the vehicle**—Identify the test vehicle by selecting from the menu options.
3. **Select the system**—Select the system to be tested from the systems menu.
4. **Connect the data cable to the vehicle**—Follow the on-screen connection instructions to connect the VERDICT S3 Scanner unit to the test vehicle.
5. **Select the test from the Scanner main menu**—Select the desired test.

5.5.1 Data Display

Depending upon the test vehicle, this selection may appear as Data, Data Display, Data Only, Data (No Codes), or something similar. All are the same, selecting has one of the following results:

- A submenu of data viewing choices displays.
- Vehicle data displays.

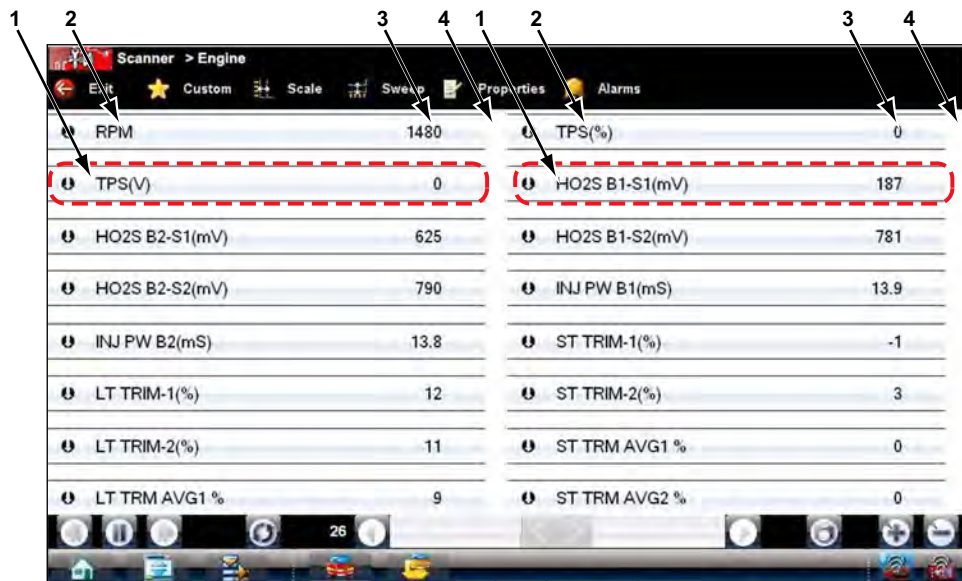
A submenu displays when more than one data viewing mode is available on the identified vehicle. On some models, the engine must be started or cranked before data can be displayed. For these models, a “Waiting to Communicate” message displays if the engine was not cranked or started.

Data Screens

When a Data selection is made, the screen displays the data list for the selected module. The items available for any control module vary from one vehicle to another.

Data is presented in a 2-column format. An abbreviated parameter name is at the left of each column and its value is at the right edge of the column. Parameters display in the order that they are transmitted by the ECM, so expect variation between vehicles.

Gesture scrolling allows you to quickly move through the data list. Simply touching the screen and drag your finger up or down to reposition the parameters being displayed. Position bars to the right of each column indicate the position of the current screen in relation to the entire list. Each column of parameters scrolls independently of the other column. [Figure 5-13](#) shows a typical data screen.



- 1— Parameter field
- 2— Parameter name
- 3— Parameter value
- 4— Position bar

Figure 5-13 Sample data screen

Data Graphs

Tap anywhere in the parameter field to open a data graph for that parameter (Figure 5-14). Selecting a parameter for graph view moves it to the top of the list. Tap anywhere in the parameter field at the top of a graph to close the graph for that parameter and return to a text view. You can view up to four graphs at a time on the VERDICT screen.

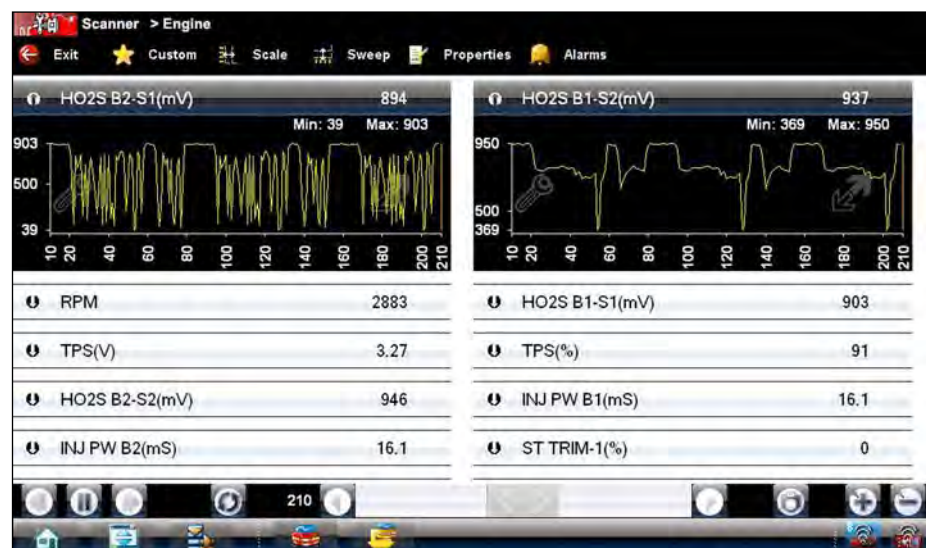




Figure 5-14 Sample graph view

The two icons display on each data graph allow you configure settings for the selected graph only:

Table 5-3 Data graph icon operations

Name	Button	Description
Expand/Collapse		Tap to expand the graph to fill the entire screen, tap again to collapse the graph to the standard view.
Graph Properties		Tap to open the Graph Properties dialog box, which allows you to set triggers for recording a snapshot and adjust the scale.

Triggers

Triggers establish threshold values, an upper limit and a lower limit, for recording a data snapshot. A snapshot allows you to closely evaluate conditions that caused the triggering event.

When a snapshot is taken, the Scanner retrieves some of the buffered data, captures data at the trigger point, and records additional data after the trigger point. This gives you a complete picture of what was happening before the fact, what occurred at the trigger point, and what happened after the fact.

Once data collection is finished, data collection pauses. A vertical line now appears on each of the data graphs to indicate the triggering point. The trigger line on the parameter that triggered the snapshot is a different color than those on the other graphs. This makes it easy to determine which parameter caused the trigger.

You can adjust the amount of data collected after a triggering event using the Properties button on the Scanner toolbar. See [“Properties” on page 45](#) for additional information.



To adjust the length of a snapshot:

1. Tap the **Properties** button on the Scanner toolbar to open the dialog box.
2. Highlight one of the **Samples After Trigger** options:
 - 0 Samples
 - 5 Samples
 - 10 Samples
 - 20 Samples
 - 50 Samples
 - 100 Samples
3. Tap the Accept button to close the dialog box.



To set triggers and record a snapshot:

1. Tap the Graph Properties icon on the parameter graph you wish to set triggers on to open the dialog box.
2. From the Graph Properties dialog box, tap **Triggers On**.
A check mark appears in the box and the minimum and maximum fields activate ([Figure 5-15](#)).



Figure 5-15 Sample Graph Properties dialog box

3. Tap either **Max:** (maximum) or **Min:** (minimum) to activate that field and open the keyboard.
4. Type the desired trigger value into the field.
5. Tap the other field and enter a trigger value, then close the virtual keyboard.
6. Tap **Accept** to close the dialog box.

Trigger lines (red for upper and blue for lower) display on the selected parameter graph.

The area between the upper and lower trigger lines establishes the triggering condition. Once the snapshot is armed, any data points that register outside of the set trigger conditions initiates a snapshot. The Scanner continues to record the preset amount of data after the trigger and includes it in the snapshot.

7. Tap **Snapshot** on the Data Buffer Toolbar to arm the snapshot.

A red background appears on the Snapshot button to indicate it has been armed (Figure 5-16).



Figure 5-16 Sample armed Snapshot button

The data capture pauses when a trigger activates.

8. Tap the Play button on the toolbar to resume viewing live data.



NOTE:

Selecting an armed Snapshot button disarms it.

Scale

Scale adjusts the upper and lower values displayed on the vertical axis of a data graph. Two scale modes are available; auto scale and manual scale. Auto scale, which is the default setting, automatically adjusts the graph scale based upon the minimum and maximum values transmitted by the ECM. Manual scale allows you to set the minimum and maximum values.



To manually set the scale on a graph:

1. Tap the Graph Properties icon on the graph you wish to scale to open the dialog box.
2. From the Graph Properties dialog box, tap **Auto Scale On**.

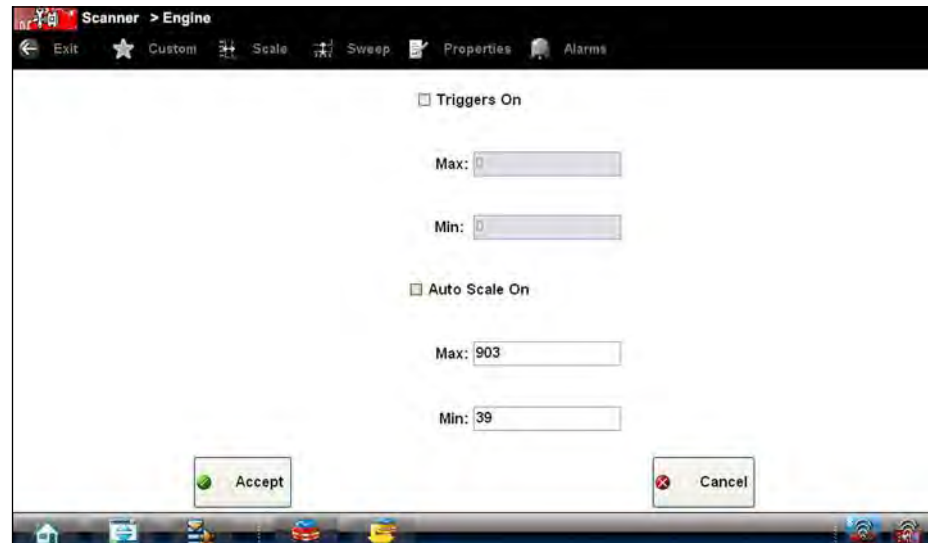


Figure 5-17 Sample manual scale selection

The check mark is cleared from the box and the minimum and maximum fields activate

3. Tap either **Max:** (maximum) or **Min:** (minimum) to activate that field and open the keyboard.
4. Type the desired trigger value into the field.
5. Tap the other field and enter a trigger value, then close the virtual keyboard.
6. Tap **Accept** to close the dialog box.

The dialog box closes and the parameter scale is now at the set values.

Using Zoom

The zoom options Data Buffer toolbar allow you to change the level of magnification of the sweep when viewing graph data. Use the Zoom In (+) button to increase magnification, and the Zoom Out (–) button to decrease magnification.

5.5.2 Codes Menu

This selection may appear as Codes, Codes Menu, Codes Only, codes (No Data), or something similar on the menu. Selecting opens a list of data parameter viewing options that include:

- Display Codes
- Clear Codes
- Freeze Frame/Failure Records
- DTC Status

Display Codes

Selecting either opens a list of diagnostic trouble codes (DTCs) stored in the selected electronic control module (ECM), or a submenu of DTC viewing options. Submenu options include:

- **Trouble Code Information**—opens a list of codes in ECM memory
- **History Codes**—opens a list codes whose symptoms are not currently present. History codes indicate an intermittently occurring problem.
- **Failed This Ignition**—opens a list of codes that set during the current ignition cycle.
- **MIL SVS or Message Requested**—displays ECM requests to light the malfunction indicator lamp (MIL) or service vehicle soon (SVS) lamp, or display a driver information alert.
- **Last Test Failed**—displays a complete list of failed tests.
- **Test Failed Since Code Cleared**—displays a list failed tests that failed since the last time codes were cleared from ECM memory.

A code list includes the DTC, a brief description, and a hyperlink to search for more detailed information about the code in the Information module ([Figure 5-18](#)).

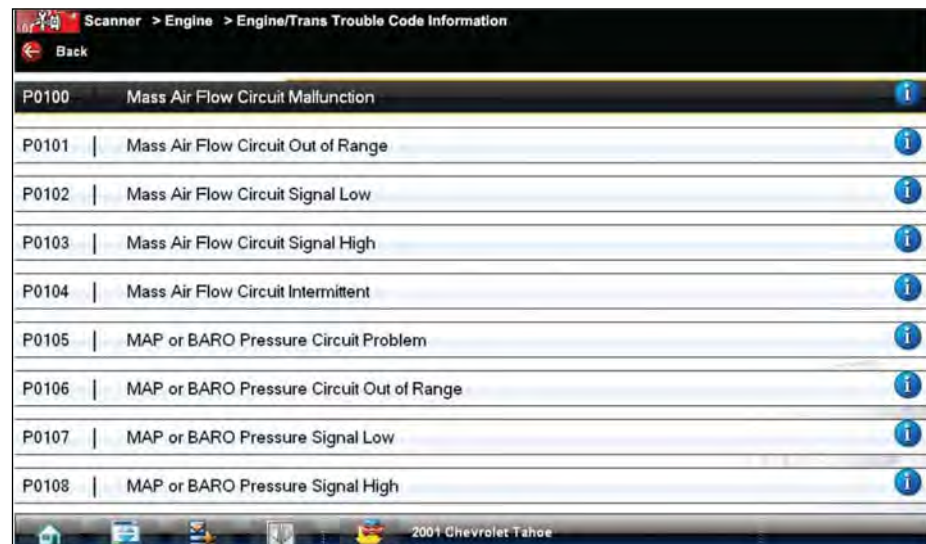


Figure 5-18 Sample code list

Tap a hyperlink, the “i” icon on the right edge of the screen, to open the Information module and initiate a search.

Clear Codes

The Scanner clears trouble codes from the control module memory on some vehicles. If this function is not available on the test vehicle, Clear Codes does not appear as a menu option.



To clear codes:

1. Select **Clear Codes** from the Codes Menu.
A confirmation message displays.
2. Make sure any conditions shown on the confirmation message are met, then select **Yes**.
A “codes cleared” message displays once the operation is complete.

3. Select **Continue** to return to the Codes Menu.

Freeze Frame/Failure Records

This selection displays the DTC that was set, along with corresponding data, when the ECM commanded the malfunction indicator lamp (MIL) to turn on.

DTC Status

This selection allows you to view the records of a particular DTC.



To check DTC status

1. Select **DTC Status** from the Codes Menu.
The DTC Status entry field displays and the virtual keyboard opens ([Figure 5-19](#)).



Figure 5-19 Sample DTC Status entry field

2. Use the virtual keyboard to enter the characters of the DTC.
3. Tap the virtual keyboard **Backspace** button if needed to erase a character.
4. Tap the virtual keyboard **Return** key once all the code characters are entered.
The DTC status report displays ([Figure 5-20](#)).

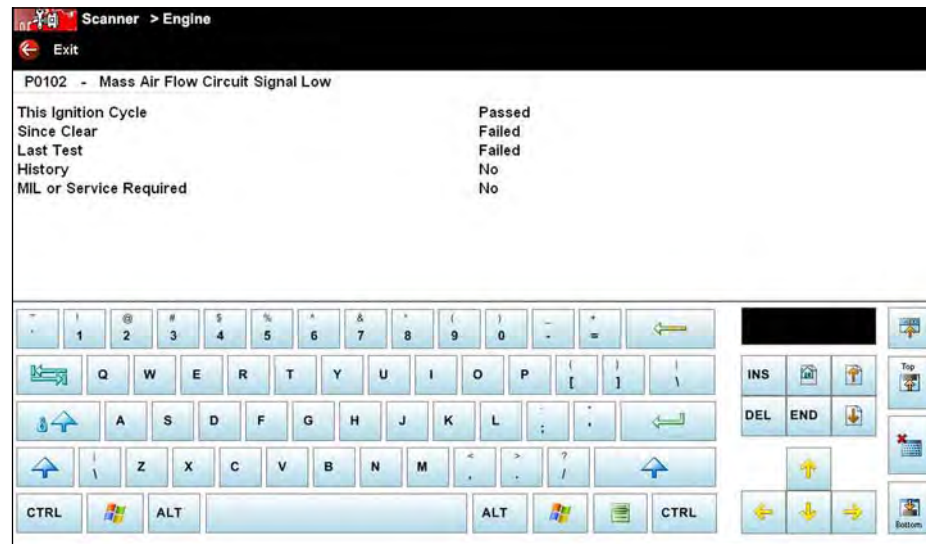


Figure 5-20 Sample DTC status report

5. Tap **Exit** to return to the DTC status entry screen.
6. Tap **Exit** again to return to the Codes menu.

5.5.3 Functional Tests

The **Functional Tests** selection is used to access vehicle-specific subsystem and component tests. Available tests vary by manufacturer, year, and model, and only the available tests display in the menu.

There are four general types of functional test operations:

- **Information Tests**—are read-only tests, like selecting “VIN” from a Functional Tests menu to display the VIN of the identified vehicle.
- **Toggle Tests**—switch a component, such as a solenoid, relay, or switch, between two operating states.
- **Variable Control Tests**—command a certain value for a system or component, such as varying the spark timing in 1° increments or the EGR valve duty cycle in 10% increments.
- **Reset Tests**—reset the adaptive, or learned, values that are stored in the control module.

Selecting Functional Tests opens a menu of test options that varies by make and model. Selecting a menu option either activates the test or opens a submenu of additional choices. Follow all screen instructions while performing tests. How and what information is presented on the screen varies according to the type of test being performed.

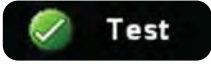






Figure 5-21 Sample functional test controls

Some toggle and variable control tests display functional test controls at the top of the screen with data stream information below (Figure 5-21).

Functional test controls allow you manipulate the test signal as shown in Table 5-4.

Table 5-4 Functional test control buttons

Name	Button	Description
Test		Activates the test.
Return		Cancels the test.
Change List		Allows you to switch data lists.
Minus		Switches an item off or low, or incrementally reduces a variable signal.
Plus		Switches an item high or on, or incrementally increases a variable signal.

5.5.4 Generic Functions

The **Generic Functions** selection opens a menu of available OBD-II/EOBD functions on 1996 and newer vehicles. For additional information on generic function refer to the *Global OBD Vehicle Communications Software Manual*. Menu options typically include:

- Readiness Monitors—displays the status of the OBD-II/EOBD required monitors
- (\$02) Freeze Frame—displays data stored in ECM memory when a DTC is set

- (\$05) Oxygen Sensor Monitoring—displays on-board oxygen sensor monitoring test results
- (\$06) Non-Continuous Monitors—displays the status of system monitors
- (\$08) Request Control of On-Board System—establishes bidirectional ECM communication
- (\$09) Calibration Identification—displays the ECM calibration identification numbers
- (\$09) Calibration Verification number—displays the ECM calibration
- (\$09) In-Use Performance Tracking—displays a monitoring conditions report
- (\$09) Vehicle Identification Number—displays the VIN

Refer to the *Global OBD Vehicle Communications Software Manual* for additional information.

5.5.5 Troubleshooter

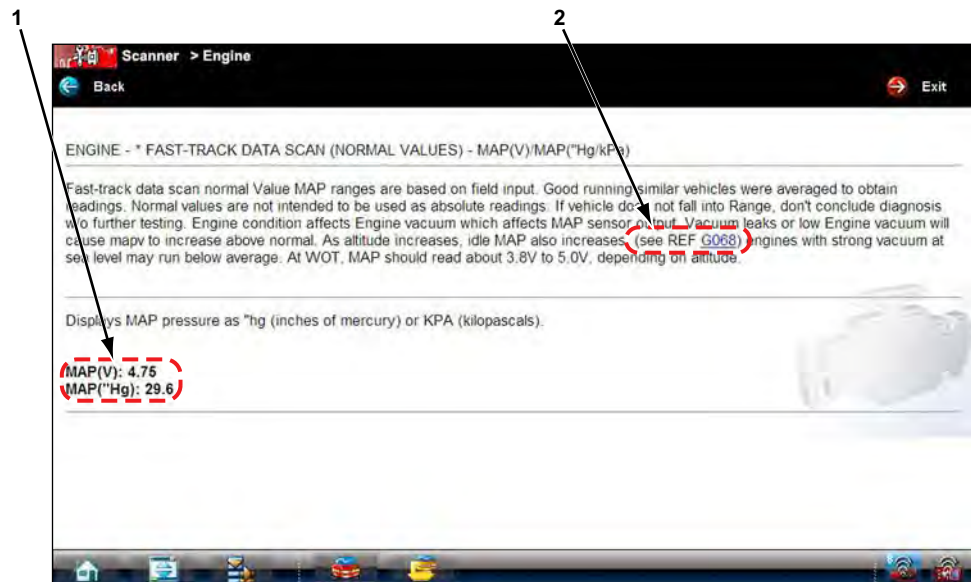
Fast-Track® Troubleshooter is a database of experience-based information of validated real-world repair strategies that have been compiled by top-notch technicians since 1988. The Troubleshooter system simplifies the diagnosis process, as it contains information on virtually all common diagnostic trouble code (DTC) problems and driveability symptoms for most vehicles covered by the vehicle communication software.

Troubleshooter information is organized into a series of diagnostic tips that are designed to quickly lead you to the root cause of a particular problem. The tips are vehicle-specific, which means only tips that relate to the identified vehicle are presented.

Troubleshooter appears in a Scanner menu only if tips are available for the system selected on the identified vehicle. Selecting opens a Troubleshooter Menu that typically includes:

- **Code Tips**—provides detailed information on setting conditions, testing, and interpreting test results for specific codes.
- **Symptom Tips**—provides diagnostic tests and procedures based on vehicle operation.
- **Time Savers**—provides supplemental information, such as firing order and #1 cylinder location, that may be needed to make a diagnosis.
- **Common Problems**—provides advice and remedies for certain “pattern failures” that have been experienced on vehicles of the same model.
- **Tests and Procedures**—explains how to perform certain tests on the specific test vehicle. Some tips provide specifications and installation information as well.
- **Fast-Track Data Scan (Normal Values)**—contains information and guidelines on how to quickly validate data readings for certain sensors and actuators, live data values are provided for comparison.

Certain live data parameter values display directly within the tip when performing Troubleshooter tests and procedures. A tip may also contain a hyperlink to a Troubleshooter Reference, another test or procedure, or a supplemental operation, such as Clear Codes. Hyperlinks are shown in blue, and tapping them opens the link. Troubleshooter References open in a separate window. (Figure 5-22).



1— Live data values

2— Hyperlink

Figure 5-22 Sample data values within a Troubleshooter tip

5.5.6 Scanner Toolbar Operations

The Scanner toolbar is used to configure certain aspects of the displayed data and to exit. The following sections explain how to use the toolbar.

Custom

The **Custom** button on the Scanner Toolbar is used to determine which specific parameters display. Minimizing the number of parameters on the data list allows you to focus on any suspicious or symptom-specific data parameters. You can add or remove most parameters from the list. Certain vital parameters, such as RPM, cannot be removed. These appear in gray at the top of the list along with a lock icon and cannot be selected.

IMPORTANT:

Limiting the number of parameters that displays to those that apply to a particular situation results in a faster data refresh rate, and reduces the amount of memory used for saved files.



To create a custom data list:

1. Select **Custom** on the Scanner Toolbar.
The parameter selection dialog box opens (Figure 5-23).
2. Create a custom data list by tapping on the parameters to be included. A parameter that displays is highlighted, a parameter that does not display is not. Keep the following in mind:
 - Item at the top of the list that cannot be highlighted are locked and cannot be turned off.
 - Drag the screen to scroll and view the entire list.

- Use the Select All button to display the complete list.
- Use the Deselect All button to remove all of the highlights.
- Use the Cancel button to return to the data display.

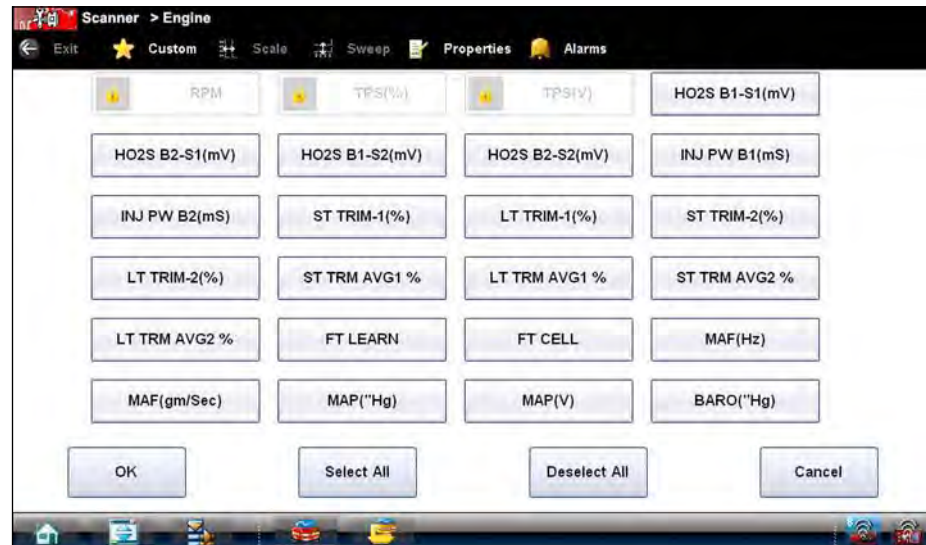


Figure 5-23 Sample custom configuration screen

3. Select **OK** to display the updated data list.

Scale

The **Scale** button on the Scanner Toolbar switches the scale values, displayed along the left-hand side of the graphs, on and off (Figure 5-24).

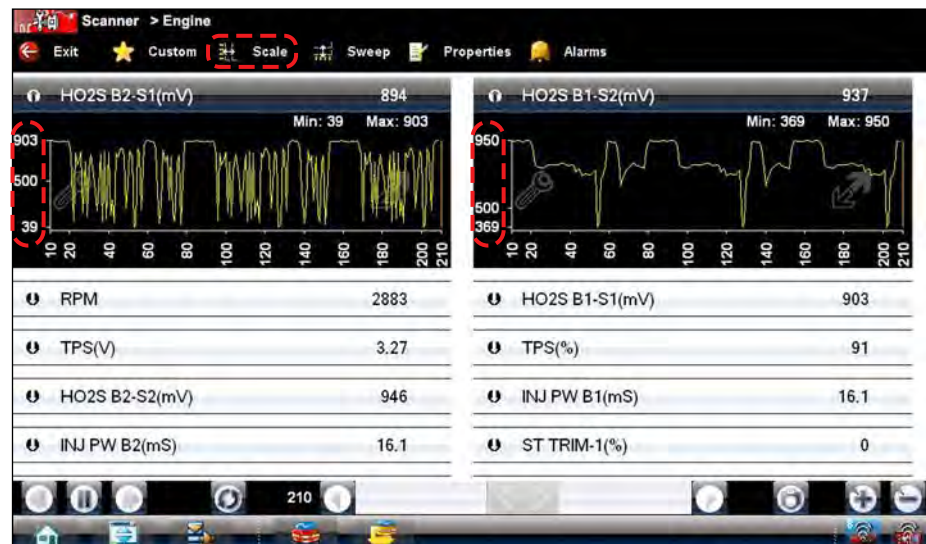


Figure 5-24 Sample data graph scales

Sweep

The **Sweep** button on the Scanner Toolbar switches the sweep values, displayed below the graphs, on and off (Figure 5-25).

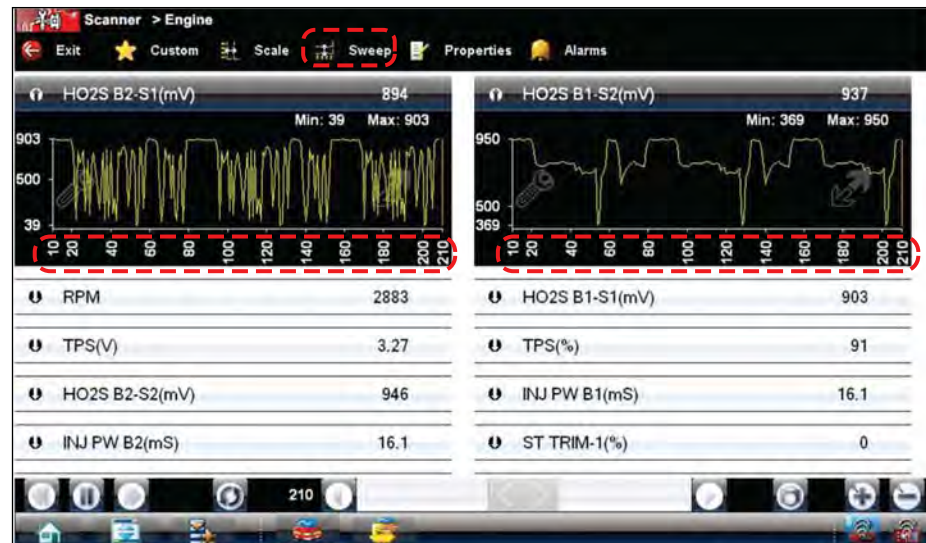


Figure 5-25 Sample data graph sweep

Properties

The **Properties** button on the Scanner Toolbar is used to configure certain characteristics of the parameter graph display. Selecting opens a Properties dialog box that allows you to adjust colors, settings, and sweep (Figure 5-26).

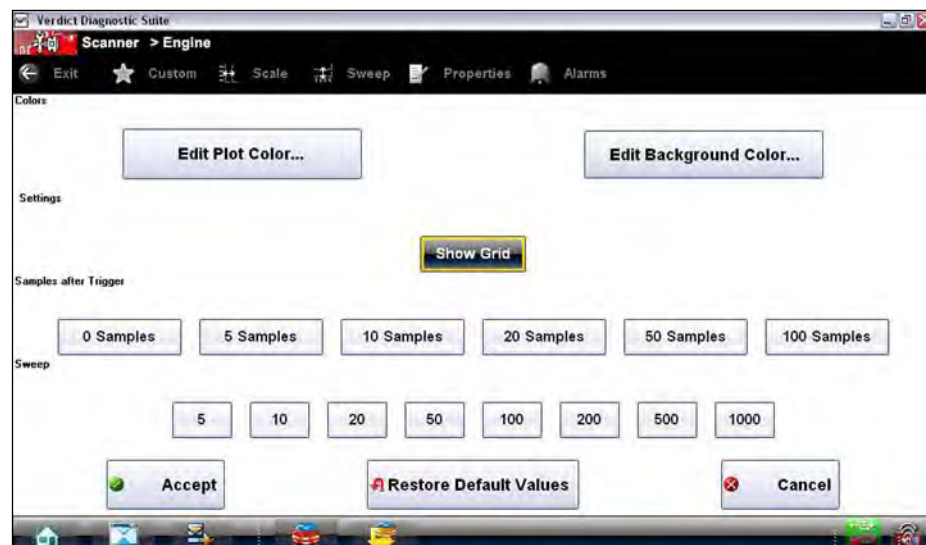


Figure 5-26 Sample properties dialog box

Selecting either color option, **Edit Plot Color** or **Edit Background Color**, opens a standard color selection dialog box. select a color, then tap **OK** to close the dialog box.

The Show Grid button is used to switch a background grid pattern on the data graphs on and off:

- To switch the grid on; tap to highlight **Show Grid**, then tap **Accept**.
- To switch the grid off; tap **Show Grid** twice so it is not highlighted, then tap **Accept**.

The Samples After Trigger setting determines how many data samples are recorded following a triggering event. The highlighted samples button indicates the number of frames that are included in the recording after a triggering event.

The sweep options let you choose the amount of data that displays across the graph. Values are in sample points, or frames of data. A frame of data equals one complete transmission of the serial data by the control module.

Alarms

Alarms are visual indicators next to a parameter in the data display list that change color to show the status of the signal. A red alarm indicates on, a gray alarm indicates off. Only parameters with a range of two states, can have alarms. Parameters with continuous ranges, such as variable voltage and pressure values, cannot have alarms.

The **Alarms** selection is used to configure visual indicators on certain digital data parameters. If a vehicle does not provide signals for these functions, the alarm indicators are unused.

The alarm indicator assignments remain as selected until you exit the data list:



To configure alarm settings:

1. Select the **Alarms** button on the Scanner Toolbar.
The Alarm List dialog box opens.
2. Check the parameters that you want to show alarms.
3. Select **Save List**.

Alarm indicators now appear next to the selected parameters in the Data List. The indicators are green when the value is high, and gray when the value is low ([Figure 5-27](#)).



Figure 5-27 Sample alarm indicators

**NOTE:**

Alarms can only be set for certain parameters. If the Alarm List dialog box is empty, no parameters are available and alarms cannot be set.

5.6 Exiting the Scanner

The Scanner remains open as long as there is an active communication link with the vehicle. You must disconnect this communication link in order to exit from Scanner tests and close the VERDICT Diagnostic Platform software. A warning message displays if you attempt to shut down with the Scanner communicating.

**NOTE:**

Damage to the vehicle electronic control module (ECM) may occur if communication is disrupted. Make sure the data cable and the USB cable are properly connected at all times during testing. Exit all tests before disconnecting the test cable or powering down the tool.

**To exit the Scanner:**

1. From an active screen, select **Exit** from the Scanner Toolbar to return to the Systems Menu.
2. From the Systems Menu, select **Back** from the Scanner data menu.

A “stopping communications” message briefly displays followed by the Scanner main menu.

Now, the Scanner is no longer communicating with the vehicle and it is safe to return to the Home screen and exit the VERDICT Diagnostic Platform.

5.7 Downloading Firmware

The internal programming of the Scanner Module, known as the firmware, can be updated using the VERDICT D7 Display Device. Firmware updates increase the Scanner diagnostic capabilities, typically by adding new tests, new models, or enhanced applications to the databases.

The display device automatically searches for available updates for all of the VERDICT components when it is connected to the internet. Any updates that are found are downloaded and stored on the device. However, the update must be installed in order to complete the process. This section describes installing an update to the Scanner Module firmware.

When the display device has downloaded and stored a Scanner firmware update it displays a notification message when Scanner is selected from the VERDICT Home screen ([Figure 5-28](#)).

Selecting OK from the firmware update message begins the process as explained in the following procedure, selecting Cancel closes the message and launches the Scanner. Not updating the firmware does not impact Scanner operations, the Scanner remains fully functional but may not benefit from the additional features available in the update. Therefore, you can delay updating the firmware until it is a convenient time to have your VERDICT out of service for a few minutes.

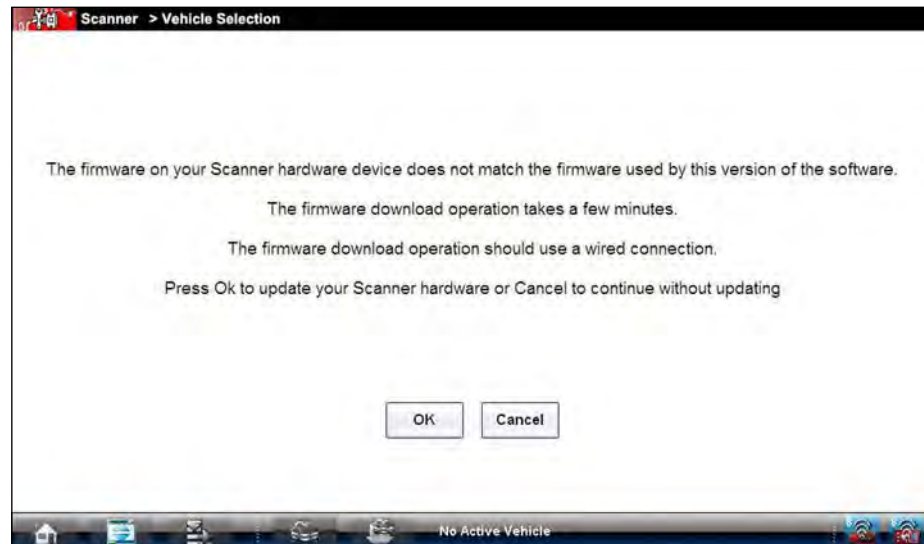
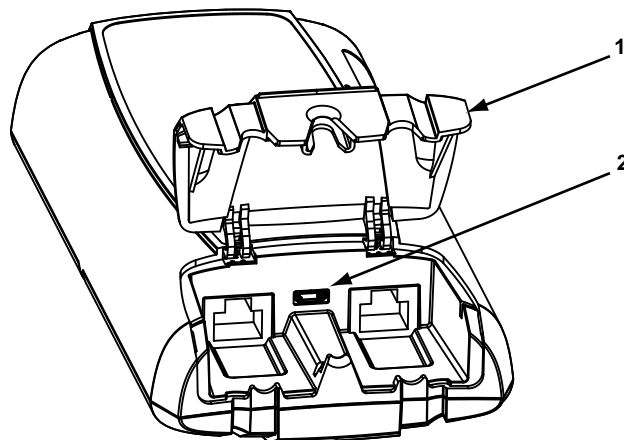


Figure 5-28 Firmware update available message



To update the firmware:

1. Power on the VERDICT D7 Display Device.
2. Connect the VERDICT S3 Scanner module to the D7 Display Device as follows (Figure 5-29):
 - a. From the bottom of the Scanner, gently lift up and out on the sides of the handgrip to free it from Scanner housing.
 - b. Open the hinged cover on the base of the Scanner to expose the service ports.
 - c. Plug the small end of the USB cable into the USB port on the Scanner.



- 1— Hinged cover
2— USB port

Figure 5-29 Scanner service ports

- d. Plug the large end of the USB cable into one of the ports on the side of the display device.



NOTE:

The Scanner and Display Device must be connected with the USB cable to update the firmware. The USB cable also provides powers to the Scanner so there is no need to connect to a vehicle.

3. Select **Scanner** from the VERDICT D7 Display Device Home screen.
4. Select OK when the firmware update notification displays (Figure 5-28).
The firmware update begins and installation progress is tracked on the screen (Figure 5-30).

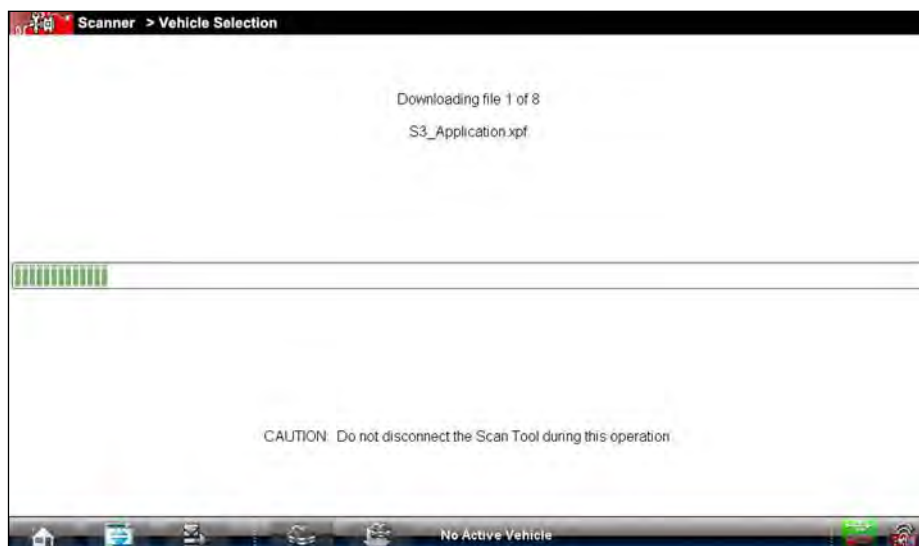


Figure 5-30 Sample update in progress screen

A "firmware has been successfully updated" message displays once the installation process is complete (Figure 5-31).



Figure 5-31 Sample firmware update complete message

5. Select **OK** to close the message and return to Scanner operations.
The S3 Scanner Module, with the latest firmware update, is now ready to use.

This Home screen option allows you to access Generic OBD-II Scanner tests without completing a vehicle identification. This option presents a quick way to check for diagnostic trouble codes (DTCs), isolate the cause of an illuminated malfunction indicator lamp (MIL), check monitor status prior to emissions certification testing, verify repairs, and perform a number of other services that are emissions-related. OBD Direct is also used for testing OBD-II compliant vehicles that are not included in the Scanner databases.

OBD Direct is a Scanner function, and the Scanner Module must be connected to the test vehicle and communicating with the display device. Keep in mind, this function provides generic OBD-II information only. Select Scanner from the VERDICT Home screen for enhanced OBD-II functions.

Selecting OBD Direct on the VERDICT Home screen opens a menu with two options ([Figure 6-1](#)):

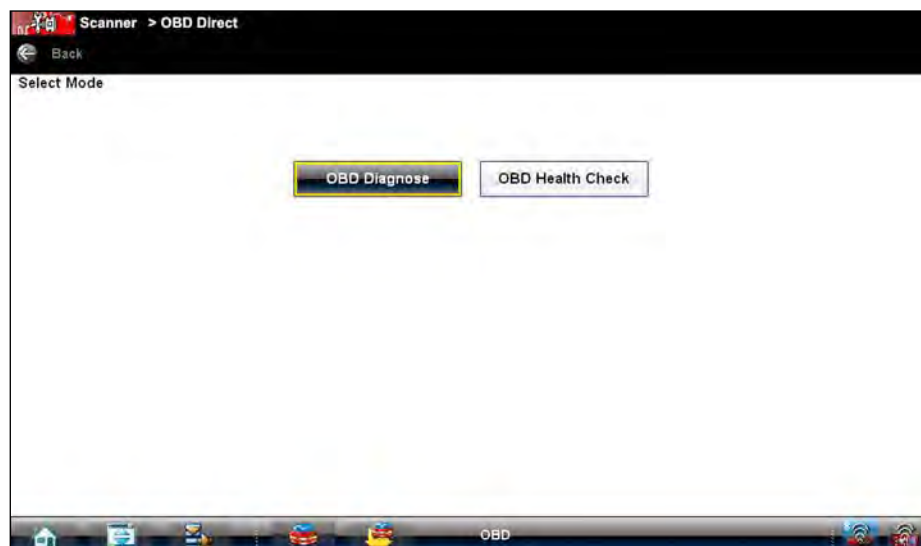


Figure 6-1 Sample OBD Direct main menu

6.1 OBD Health Check

The OBD Health Check offers a way to quickly check for and clear generic diagnostic trouble codes (DTCs) and to check readiness monitors. Selecting OBD Health Check opens a submenu of options ([Figure 6-2](#)).

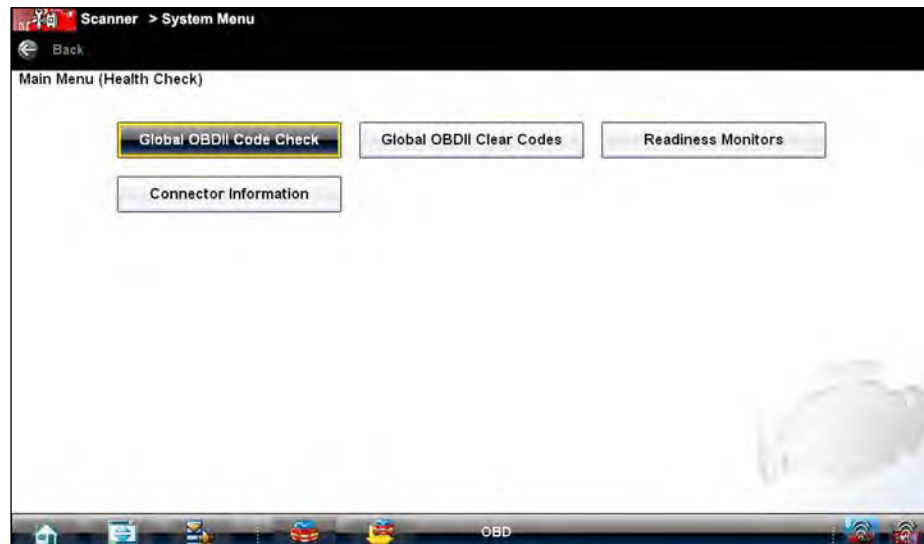


Figure 6-2 Sample OBD Health Check menu

6.1.1 Global OBD II Code Check

This option displays any stored emission related generic DTCs reported by the ECM. Selecting this option opens a submenu with two choices: Codes and Pending Codes.

Select an option to display the code list. Refer to ["Codes Menu," on page 37](#) and the *Global OBD Vehicle Communication Software Manual* for additional information.

Codes

The Codes option displays a list of current emission related DTCs.

OBD-II Codes have a priority according to their emission severity, with higher priority codes overwriting lower priority codes. The priority of the code determines the illumination of the MIL and the code erase procedure. Vehicle manufacturers have implemented the ranking differently, so there will be differences between makes.

Pending Codes

The purpose of this service is to enable the scan tool to obtain "pending" or maturing diagnostic trouble codes. These are codes whose setting conditions were met during the last drive cycle, but need to be met on two or more consecutive drive cycles before the DTC actually sets.

The intended use of this service is to assist the service technician after a vehicle repair and after clearing diagnostic information, by reporting test results after a single driving cycle.

- If a test failed during the driving cycle, the DTC associated with that test is reported. If the pending fault does not occur again within 40 to 80 warm-up cycles, the fault is automatically cleared from memory.

- Test results reported by this service do not necessarily indicate a faulty component or system. If test results indicate another failure after additional driving, then a DTC is set to indicate a faulty component or system, and the MIL is illuminated.

6.1.2 Global OBD II Clear Codes

This option is used to clear all emission related diagnostic data such as, DTCs, freeze frame data, and test results from the memory of the selected ECM. Although OBD Direct only displays generic OBD-II data, clearing codes erases all of the stored data including any enhanced codes.

A confirmation screen displays when the clear codes option is selected to prevent accidental loss of data. Select Yes on the confirmation screen to continue. Refer to ["Codes Menu," on page 37](#) and the *Global OBD Vehicle Communication Software Manual* for additional information.

6.1.3 Readiness Monitors

Use this menu option to check the readiness of the monitoring system. An OBD-II system checks the status of emission-related subsystems by running continuous or periodic tests. Test results are shown in the data viewer ([Figure 6-3](#)).

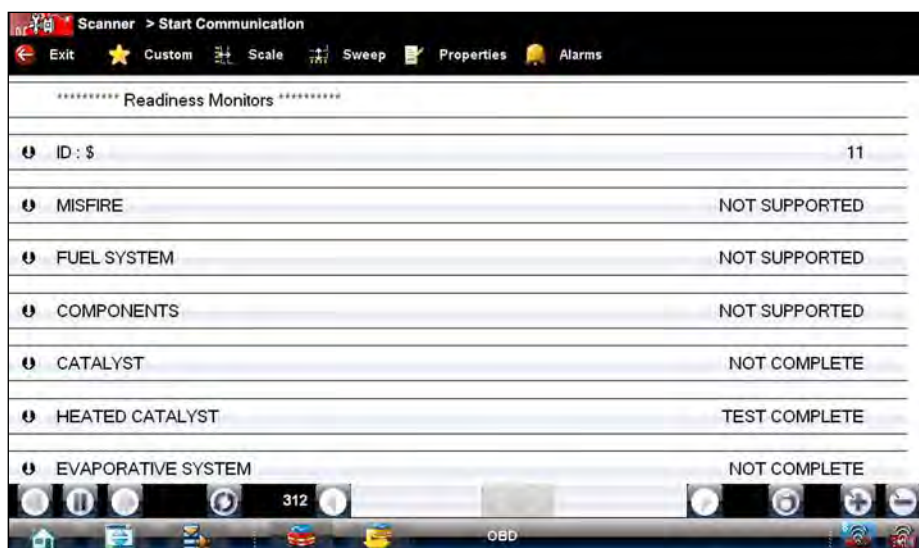


Figure 6-3 Sample readiness monitor test report

Gesture sweep to view the entire list of Readiness Monitors to ensure that all tests are complete. It is possible to print the readiness test status or save it as part of a Vehicle history.

6.1.4 Connector Information

This option opens a database of vehicle diagnostic connector locations that includes most makes and models. The menu driven interface leads you quickly to the difficult to find test connector.

**To locate a vehicle diagnostic connector:**

1. Select **Connector Information** from the System menu.
2. Select a manufacturer from the list presented.
3. Select a model from the list presented.
Instructions for which, if any, cable adapter or pin to use.
4. Select **Continue**.

Information on where to locate the vehicle diagnostic connector display ([Figure 6-4](#)).

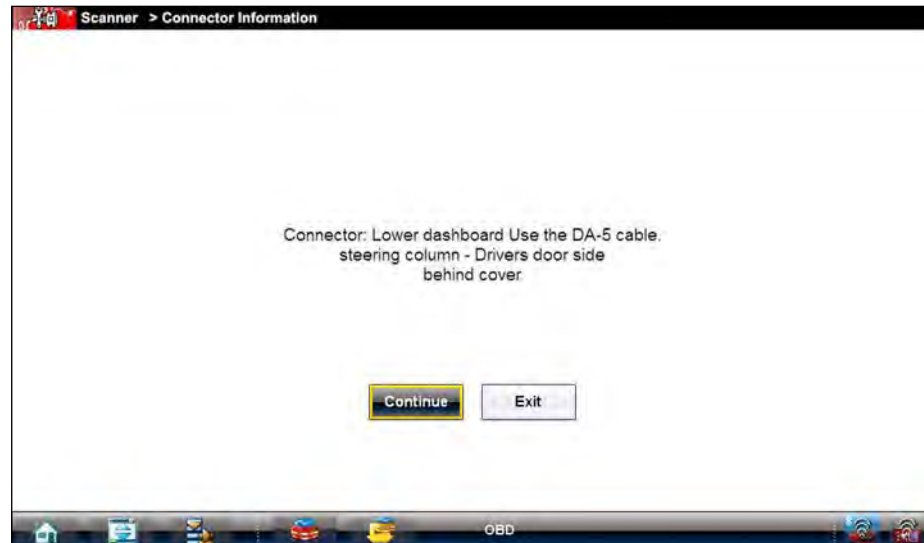


Figure 6-4 Sample connector location message

5. Select **Continue** to return to the System menu.

6.2 OBD Diagnose

Selecting OBD Diagnose opens a menu with the following options:

- Start Communication—begins the test session
- Select Communication Protocol—allows you to select which protocol to use
- Connector Information—provides data link connector (DLC) location details for most models

6.2.1 Start Communication

Use the following procedure to conduct an OBD Direct test session:

**To perform an OBD Direct Test:**

1. Select **Start Communications** from the OBD Direct menu.
A generic connection message displays ([Figure 6-5](#)), connect the Scanner module to the test vehicle as instructed.

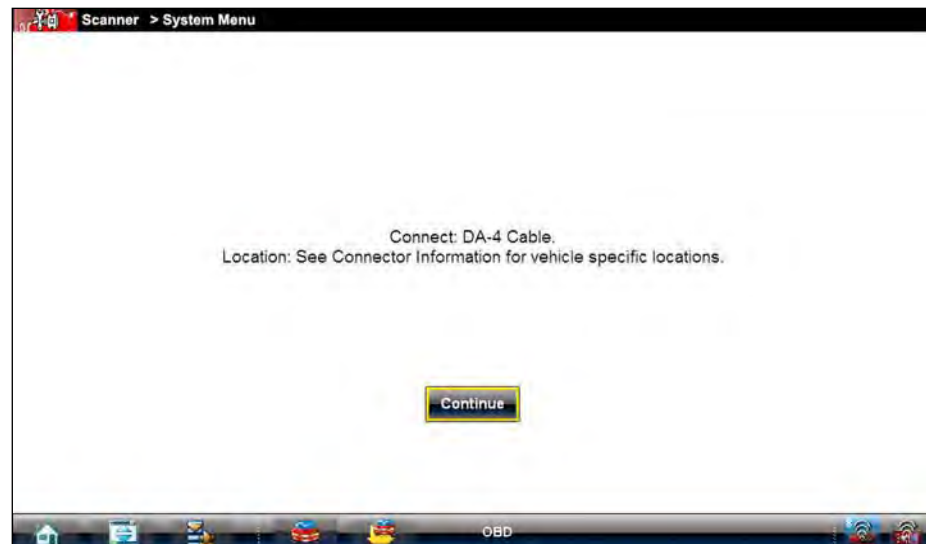


Figure 6-5 Sample generic connection message

2. Select **Continue**.

A communications message that shows how many ECMs were detected, Which ECM is communicating, and which communication protocol is being used (Figure 6-6).

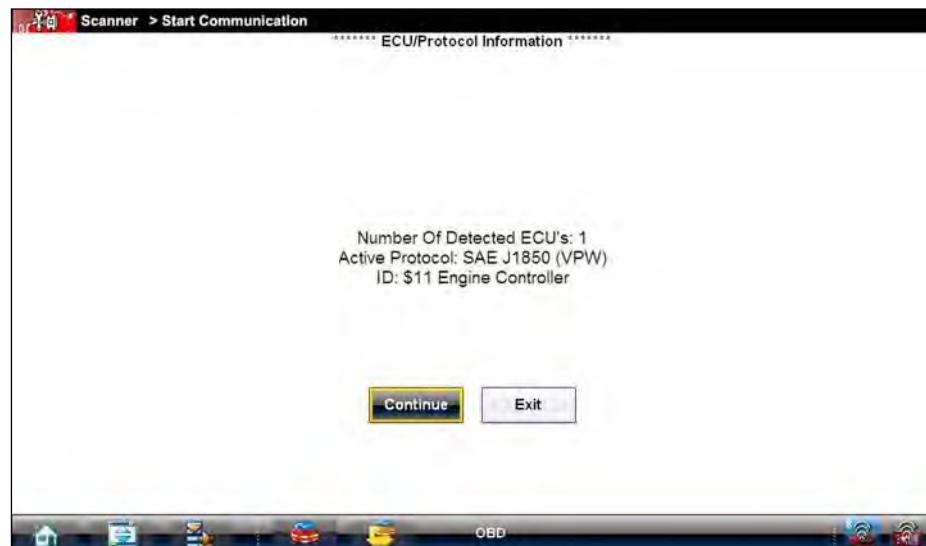


Figure 6-6 Sample communication message

3. Select **Continue**.

A menu of available tests displays, options include (Figure 6-7):

- Readiness Monitors
- MIL Status
- Display Current Data (\$01)
- Clear Emissions Related Data (\$4)
- Display Freeze Frame Data (\$02)
- Display Trouble Codes (\$03)

- Display Test Parameter/Results (\$05, 06, 07)
 - Request Control of On-Board System (\$8)
 - Read Vehicle Identification (\$09)
4. Select a test to continue.

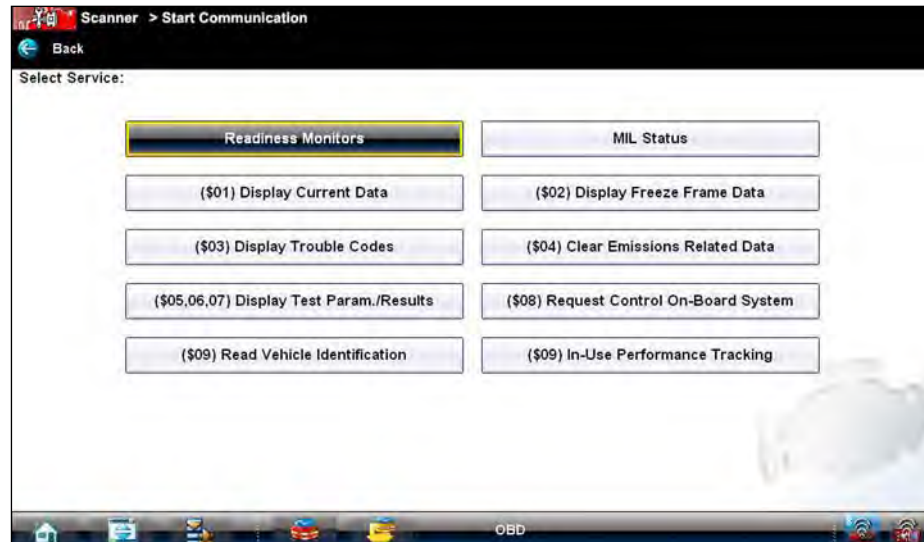


Figure 6-7 Sample Start Communication menu

Readiness Monitors

Use this menu item to check the readiness of the monitoring system. If a monitor system is not supported, it is not displayed. Scroll, if needed, to view the entire list of monitors. Selecting Readiness Monitors opens a submenu with two choices:

- Monitors Complete Since DTC Cleared—displays the results of all monitor tests that have run since the last time the electronic control module (ECM) memory was cleared.
- Monitors Complete This Cycle—displays only the results of monitor tests that ran during the current drive cycle, they reset when the ignition is switched off.

MIL Status

This item is used to check the current condition of the Malfunction Indicator (MIL). Additional information, such as which ECM commanded the MIL on and the distance driven while the MIL is on (if supported), can also be displayed. It is also possible to print the MIL Status.

(\$01) Display Current Data

Use this item to display the current emission related data from the selected electronic control module (ECM) of the vehicle. Displayed data includes analog inputs and outputs, digital inputs and outputs, and system status information broadcast on the vehicle data stream.

(\$02) Display Freeze Frame Data

This item is used to display freeze frame data for any stored emission related diagnostic trouble codes (DTC). In most cases the stored frame is the last DTC that occurred. Certain DTCs, those that have a greater impact on vehicle emission, have a higher priority. In these cases, the highest priority DTC is the one for which the freeze frame records are retained.

Freeze frame data includes a “snapshot” of critical parameter values at the time the DTC set.

(\$03) Display Trouble Codes

This is used to display any stored emission related DTCs reported by the various ECMs.

(\$04) Clear Emissions Related Data

This item is used to clear all emission related diagnostic data such as, DTCs, freeze frame data, and test results from the memory of the selected ECM.

(\$05, 06, 07) Display Test param./Results

This selection opens a submenu of test parameters and test results from various sensors, such as the oxygen sensor (O2S), monitor test results, and a record of DTCs detected during the last drive cycle. The menu includes:

- Oxygen Sensor Monitoring (\$05)
- Specific Monitored Systems (\$06)
- DTCs Detected During Last Drive (\$07)

(\$08) Request Control of On-board System

This service enables bidirectional control of the ECM, that is the Scanner transmits control commands to operate the vehicle system. This function is useful in determining how well the ECM responds to a command.

Available options vary by make, model, and year of the test vehicle. Select a test and follow the on-screen instructions.

(\$09) Read Vehicle Identification

This selection displays the vehicle identification number (VIN), the calibration identification, and the calibration verification number (CVN) of the test vehicle.

(\$09) In-use Performance Tracking

This selection displays the “In-use Performance Tracking” of monitored data. It is basically a record of the number of times each of the monitor tests have been completed.

6.2.2 Select Communication Protocol

A communication protocol is a standardized way of data communication between an ECM and a scan tool. Global OBD may use the following communication protocols:

- ISO 9141-2 (K-LINE)
- SAE J1850 PWM (Pulse Width Modulation)
- SAE J1850 VPW (Variable Pulse Width)
- ISO 14230-4 (Keyword Protocol 2000)
- SAE J2284/ISO 15765-4 (CAN)

Touch **Select Communication Protocol** to open a menu of options ([Figure 6-8](#)).

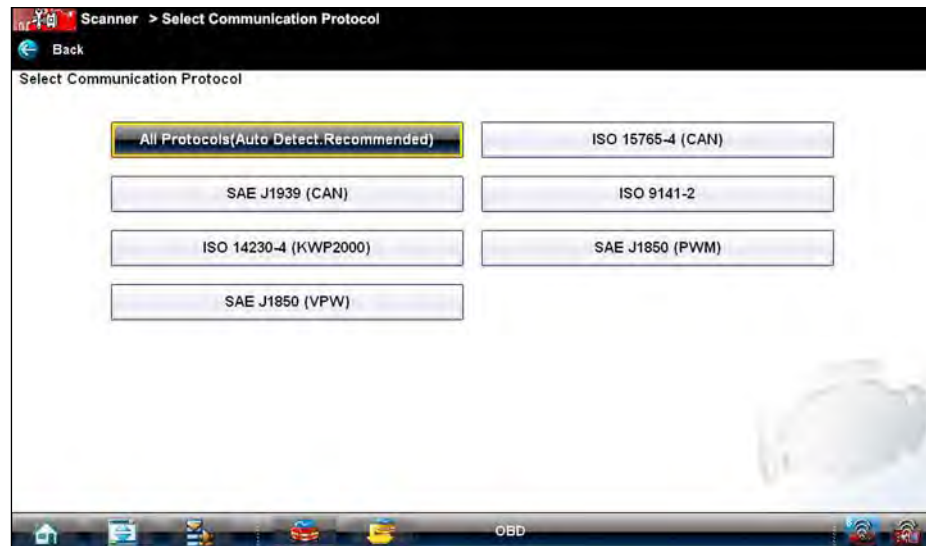


Figure 6-8 Sample communication protocol menu

When the All Protocols setting is used the Scanner attempts to establish communication using each protocol on order to determine which one the vehicle is broadcasting on.

6.2.3 Connector Information

This option opens the same database of vehicle diagnostic connector locations as discussed for OBD Health Check testing. Refer to ["Connector Information,"](#) on page 52.

The Component Test software is a component-testing powerhouse, providing you with a robust diagnostic database for use with scopes and meters. It is like having access to a complete library of shop manuals for testing engine-management components, transmission sensors and components, and ABS systems.

Component Test helps you with everything from selecting the appropriate test for a specific component to showing the hook-up location and correct pin configuration. This software thoroughly guides and instructs you on proper testing procedures and offers tips from the internal troubleshooter database. The component test procedures, tips, and meter settings reduce your overall set-up and diagnostic testing time. Vehicle-specific component tests are provided for engine, transmission, ABS, charging, transfer case and suspension systems.

CAUTION

Risk of electrical shock.

- **Read the Important Safety Instructions document provided separately for messages on the safe use of this product.**
- **This product is intended for Measurement Category I (for example, automotive 12V systems), do not use this product for Measurement Categories II, III, and IV.**
- **Measurement Category I is for performing measurements on circuits not directly connected to MAINS or MAINS circuits (an example of a MAINS circuit is 120V AC or 240V AC household or industrial electricity), do not connect this product to MAINS or MAINS circuits.**
- **Maximum rated transient over voltage impulse is 500 volts, do not exceed the rated transient over voltage.**

Electrical shock can cause personal injury, equipment damage, or circuit damage.

7.1 Vehicle Identification

The component test information presented is specific to the vehicle being tested. Therefore, certain attributes of the test vehicle must be entered into the VERDICT unit so that the correct data can be retrieved. Vehicle identification information is carried over if you enter the Component Test module either from the Scanner module or from one of the records stored in the Vehicle History module. However, you may need to enter additional attributes in some instances.

The vehicle identification sequence is menu driven, you simply follow the screen prompts and make a series of choices. Each selection you make advances you to the next screen.

7.1.1 Creating a Favorites List

Once a Component Test database is loaded, a list of manufacturers displays. This list is often long and includes makes that are not frequently used. A toolbar at the top of the screen allows you to custom configure the manufacturer list to display only the makes you frequently service.



Figure 7-1 Sample manufacturer list

**To custom configure the manufacturer list:**

1. Tap **Configure Favorites** on the toolbar.
A list of selectable manufacturers displays.

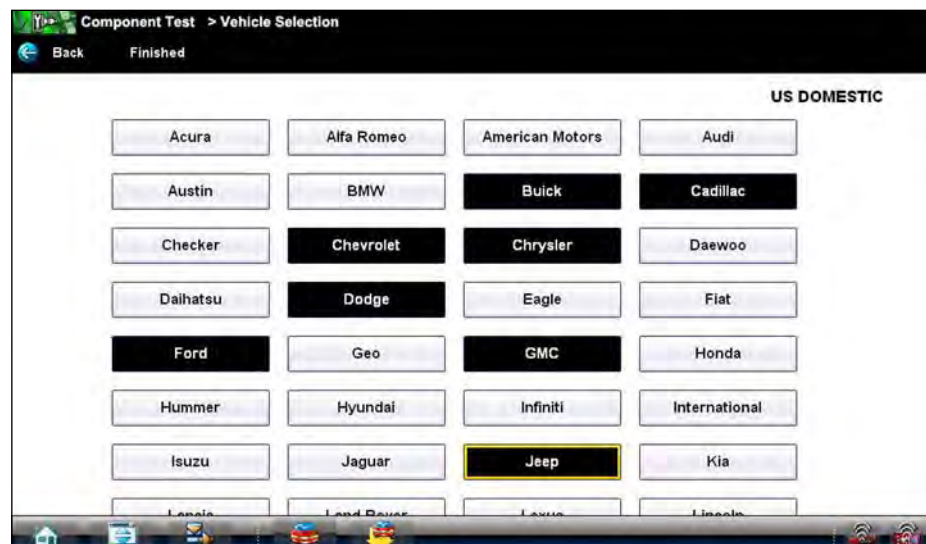


Figure 7-2 Sample Configure Favorites screen

2. Tap each manufacturer you want to include, selected manufactures are highlighted.

**NOTE:**

Manufacturers appear on the favorites list in the order in which they are selected. Therefore, if you select the makes you work on most frequently first, they will appear at the top of the list.

3. Tap **Finished** on the toolbar once your selections have been made.
The screen returns to the manufacturer list, but only the makes you selected display. Note the "Favorites" toolbar selection now reads "Full list".

4. Tap **Full List** on the toolbar to view the complete list of manufacturers.
5. Tap **Back** on the tool bar at any time to return to the previous screen.

Your favorites list is what will display whenever a Component Test database is launched in the future. The list can be modified at any time by selecting Configure Favorites from the toolbar.

7.1.2 Identifying a Test Vehicle

Exact procedures to identify the test vehicle may vary somewhat by vehicle and market. The following procedure, which identifies a 2008 Ford Focus for testing the fuel injection system, is typical of what to expect.



To identify a vehicle for Component Test:

1. Tap the **Component Test** module button from the Home screen.
2. Select which database to load for the test vehicle if requested (optional).
After the database loads, a list of manufacturers displays.
3. Select **FORD** and a list of systems available for testing displays ([Figure 7-3](#)).

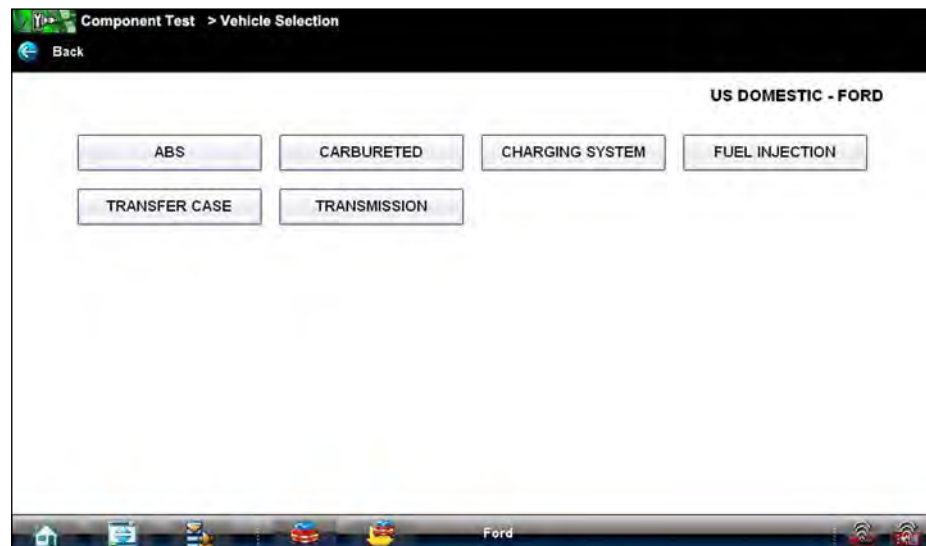


Figure 7-3 Sample available systems menu

4. Select **FUEL INJECTION** and a model year menu displays.
5. Select **2008** from the year menu and a list of available models displays.
6. Select **FOCUS** from the model list and a list of available engines displays.
7. Select **2.0L ZETEC** from the engine list and a confirmation dialog box displays ([Figure 7-4](#)).



Figure 7-4 Sample confirmation dialog box

8. From the Confirm vehicle details dialog box, select **Ok** to continue, or **Cancel** to return to the engine list.
9. A list of tests available for the identified vehicle displays, select a test to continue (Figure 7-5).

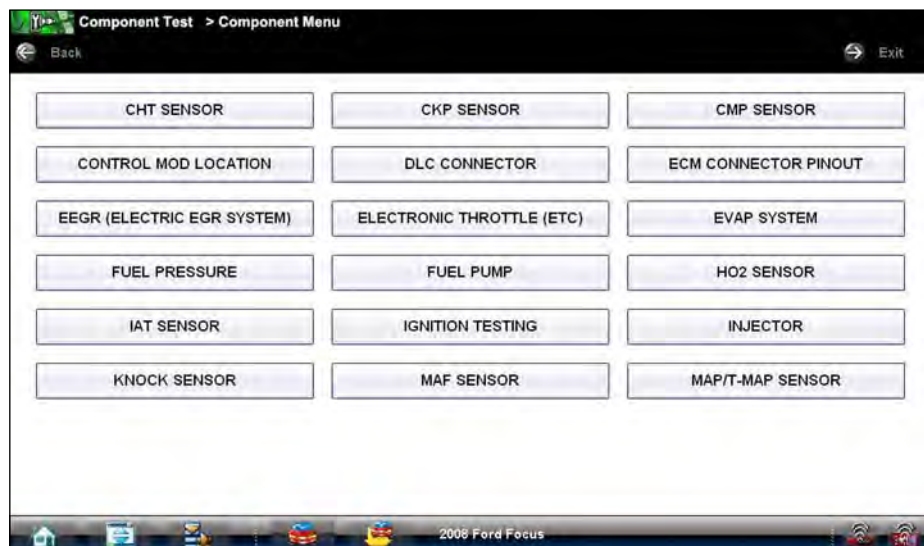


Figure 7-5 Sample available tests list

The identification sequence is now complete, refer to the Operations section that follows for details on how to navigate through the Component Test information and perform tests.



NOTE:

If you return to the Home screen and select Scanner or Information the vehicle identification entered here is carried over. However, additional information may be needed in some instances.

7.2 Operations

The Component Test software provides vehicle specific component test procedures and information that aid in setting up scopes and meters. Once a test vehicle is identified, you can select a component test from the list of available tests. For most selections two main choices are available on the component menu:

1. **COMPONENT INFORMATION**—provides information on the selected component and connector pin details that assists you in understanding the components prior to diagnosis.
2. **TESTS**—provides a pre-configured list of tests, guides you through performing the tests, and offers tips and resources to reduce setup and testing time.

7.2.1 Component Information

Component Information provides details on specific vehicle components to provide a better understanding the components prior to diagnosis.

The Component Information screens contain information to assist you with testing. The screens are divided in sections to help quickly guide you to the correct information (Figure 7-6):

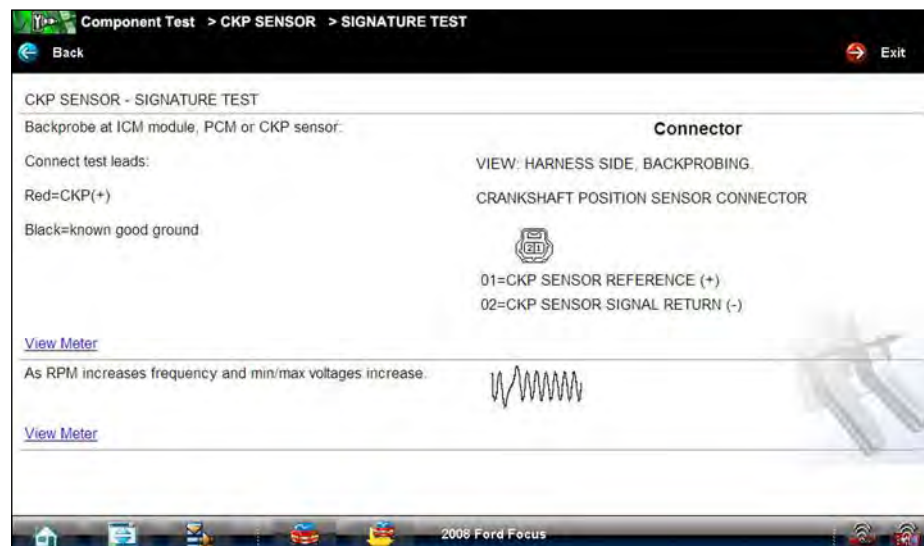


Figure 7-6 Sample Component Information screen

- **Operation**—provides a general description of normal component operation.
- **Connector**—displays the component connector and lists pin assignments.
- **Location**—identifies the component location and the best place for testing it.
- **Tech note**—provides component test-related tips (for example, common failures or faults) as well as update or recall information.



To view component information:

1. Select a component from the tests list.
2. Select **COMPONENT INFORMATION** from the component menu.

**NOTE:**

An additional selection, such as front or rear for an oxygen sensor (O2S), may be required before advancing to the component information screen.

The component information screen displays (Figure 7-6). A scroll indicator along the right edge of the screen appears if there is additional information below what is on the screen.

3. Gesture sweep to view any additional information.
4. Select **Back** at any time to return to the previous screen.

7.2.2 Tests

The Tests section guides you through the process of performing test on a specific component. It also provides specifications, tips on how and where to connect the test meter leads, and also configures the multimeter or lab scope to perform the selected test.

Once a test vehicle is identified, you can select a component from the available tests list.

**To select a test:**

1. Select a component from the list.
2. Select **TEST** to open the list.

**NOTE:**

More than one selection is available in some instances. For example, a primary and a secondary tests selection display when ignition tests is selected.

The list shows all of the tests available for the selected component, choices vary by make, model, and year.

Some tests, such as O2S voltage, open an additional submenu similar to the one shown in Figure 7-7 when more than one option is available.

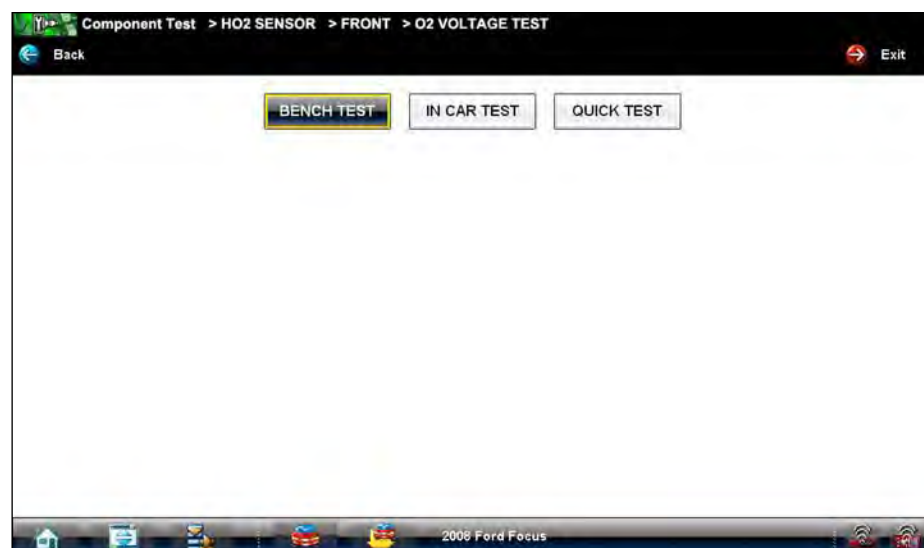


Figure 7-7 Sample O2S voltage test submenu

3. Select a test option and the test screen displays (Figure 7-8).

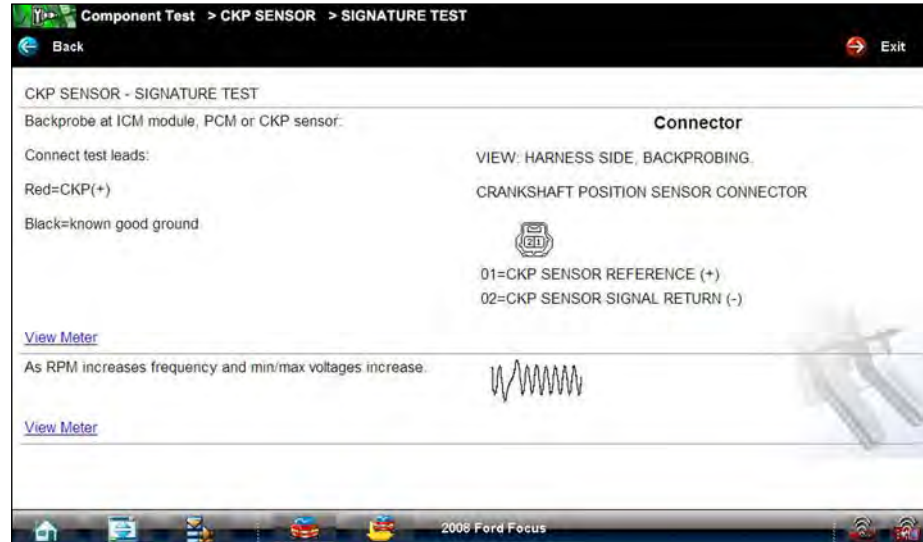


Figure 7-8 Sample Test screen

A scroll indicator along the right edge of the screen appears if there is additional information below what is on the screen.

4. Gesture sweep to view any additional information.
5. Select **Back** at any time to return to the previous screen, or select **Exit** to return to the main component menu.

Hyperlinks

Component test screens contain hyperlinks that either take you to another page that contains additional information or open an additional window on top of the current screen. Hyperlinks display as blue lettering with an underline, the color changes once the link has been selected. Common hyperlinks are:

- **View Meter**—opens a live meter set up to perform the test in the lower portion of the screen (Figure 7-9). Once the meter view is open, the Component Test toolbar at the top of the screen is replaced by the Scope Multimeter toolbar, which allows you to make adjustments to the settings. See “Scope Multimeter Toolbar” on page 93 for details.
- **Show More Information**—advances to a new screen with more detailed information about a particular test, select **Back** to return to the test screen.

View Meter

A Meter button, which is only available in the Component Test view meter mode, appears on the upper toolbar (Figure 7-9).

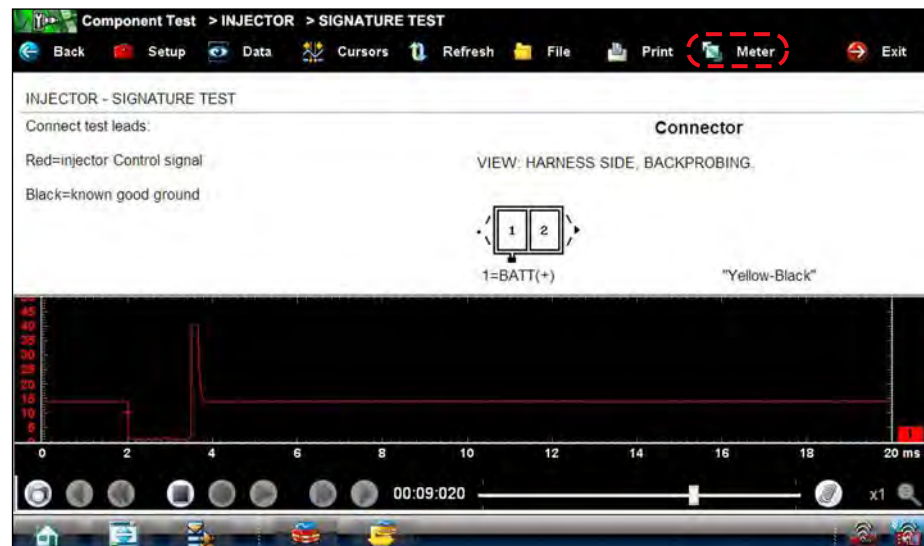


Figure 7-9 Sample view meter window

Three view meter options are available:

1. With View Meter active (Figure 7-9), tap the toolbar **Meter** button once and the meter expands to fill the entire screen.
2. Tap the **Meter** button a second time and the meter open as a separate window (Figure 7-10). This window can remain open if you switch to the Scanner module and can be accessed from the Windows toolbar at the bottom of the screen. You can also resize and reposition the meter window on the screen.

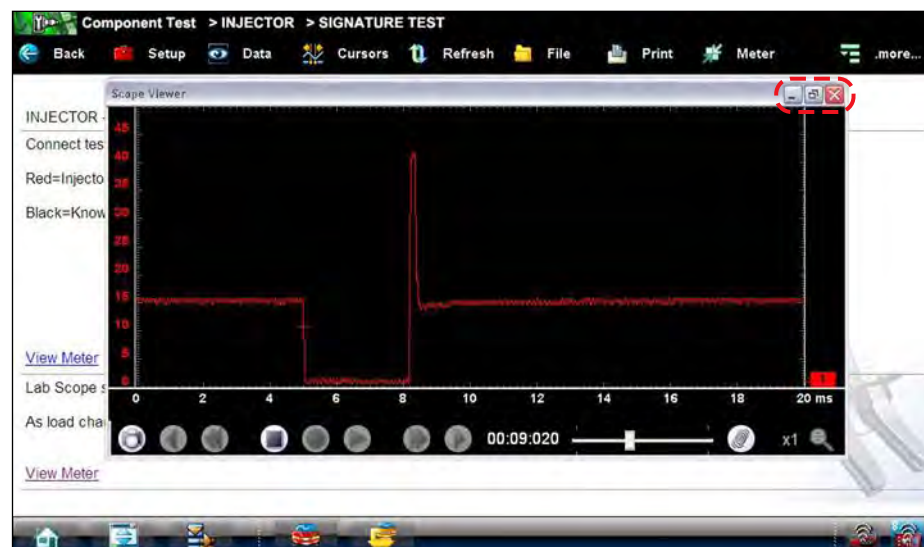


Figure 7-10 Sample meter view in a separate window

3. Tap the **Meter** button a third time to close the window and return to the standard view as shown in Figure 7-9.
4. There are two ways to close meter view and return to the Component Test screen:
 - Tap the **Close** button (red box with an X) on the Scope Viewer toolbar.
 - Select **More > Exit** from the Component Test toolbar.

Connecting to a Test Vehicle

Before performing a test, you must connect the meter test leads to the vehicle. Certain component tests require the use of specific leads. Information on specific leads and other connecting information displays in the initial test screen. Follow the on-screen connection instructions in the test procedure and support sections to connect the test leads.

Performing a Test

Once you connect the test leads to the vehicle, you can proceed with testing.



To perform component tests:

1. Follow the instructions display in the test procedure section.
2. Gesture sweep to view all of the instructions and follow the on-screen procedures.
3. Select the View Meter hyperlink to display test results.
4. Refer to the on-screen information to verify test results.

IMPORTANT:

Refer to [“Scope Multimeter Operations” on page 89](#) for additional information on working with the View Meter window.

This chapter discusses how to use the hardware controls and features, and how to download and install software updates for the VERDICT M2 Data Acquisition Module.

8.1 Controls, and Features

There are two sets of controls for the M2 Data Acquisition Device:



- 1— **Soft Keys**—select test functions, which vary depending upon the Rotary Switch position
- 2— **Rotary Switch**—establishes the primary operation of the unit

Figure 8-1 VERDICT M2 controls










The following sections describe the external controls and features of the M2 unit.

8.1.1 Rotary Selector Switch

The VERDICT M2 is a combination digital-multimeter (DMM) and waveform viewer, capable of reading volts (AC and DC), resistance (ohms), capacitance (farads), continuity, diode forward voltages, and external auxiliary probes, as well as viewing dynamic voltage graphs (waveforms). The Rotary Selector Switch on the front panel determines which measurements are taken.

The available functions are represented by graphic icons on the face of the tool. Descriptions of the functions are given in the following table:

Table 8-1 Data Acquisition Device rotary switch settings









Function	Icon	Description
Off		Switches power to the M2 unit off. The switch should be in this position when the tool is not being used to prevent battery drain.
Volts DC		Measures direct current (DC) voltages within a range of zero to 1000 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Volts AC		Measures alternating current (AC) voltages within a range of zero to 1000 volts. This setting is also used to measure frequency (hertz), duty cycle (%), and time period (cycle, ms).
Resistance		Measures the DC resistance to current in ohms in a range of zero to open circuit (infinite).
Continuity/ Diode Check		Performs dual tests; circuit continuity and diode test (forward drop). The “S” (special function) soft key switches between the two tests.
Auxiliary		Performs three auxiliary tests; current (amperes), pressure, and temperature. The “S” (special functions) soft key switches between the three tests. Pre-approved sensors must be used in order to take valid measurements.
Capacitance		Measures capacitance in nanofarad (nF), millifarad (mF), and microfarad (μF).
Oscilloscope (Waveform Viewer)		Configures the M2 unit to perform as one or two channel oscilloscope, or waveform viewer.
Remote Functions		Configures the M2 unit to be operated through the Display Device. Readings are also shown on the Display Device screen. All of the controls on the front panel of the M2 unit become inoperative when the rotary switch is in this position.

8.1.2 Soft Keys

The eight soft keys located above the rotary dial on the M2 unit are used to initiate a variety of additional functions while performing meter tests. The functionality of the soft keys varies according to what type of tests are being performed, as determined by the position of the rotary switch. Some of the soft keys do not function for certain test modes.

The table below gives a brief general description of soft key operations, the “Mode” column lists the tests during which the key is active. More detailed information is found in the categorical sections that follow.

Table 8-2 Data Acquisition Device Soft Key functions

Name	Key	Description	Mode
F1		Switches the displayed value between a “normal” and relative reading.	Volts DC, Volts AC, Resistance, Auxiliary
F2		Freezes, or pauses, the data being displayed. A second push returns the display to live data.	All except Continuity and Diode Check
F3		Changes the measurement range when operating in the Volts DC, Volts AC, Resistance, Auxiliary, or capacitance range. Changes the time base when operating in the graph mode.	Volts DC, Volts AC, Resistance, Capacitance
F4		Select special functions when operating in oscilloscope mode.	Waveform Viewer
S		The Special Functions key switches the displayed value between frequency, duty cycle, and pulse width, and selects a continuity or diode test. Also selects submenus when operating in oscilloscope mode.	Volts DC, Volts AC, Waveform Viewer
Min/Max		The Min/Max key displays the minimum and maximum sampled signal values along with the current value.	All except Continuity and Diode Check, Capacitance
Range		The Range key switches between the precision of the displayed value between the four available ranges.	All
Graph		The Graph key switches the display from a digital readout to a histogram, or graph.	Volts DC, Volts AC, Resistance, Auxiliary

In general, a short or momentary push of a soft key activates the assigned function, a long push returns to the normal display.

8.2 Digital Multimeter Operations

This section details the digital multi-meter (DMM) features available based on the Rotary Selector Switch position.

8.2.1 Volts DC

The Volts DC setting is used for measuring direct current (DC) voltages within a range of zero to 1000 volts, frequency, duty cycle, and pulse width.

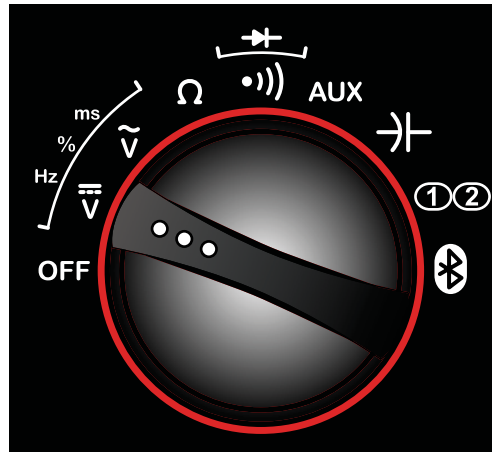


Figure 8-2 Volts DC selected

A typical Volts DC screen with Min/Max active is shown in [Figure 8-3](#). Note the functions of the F1, F2, and F3 soft keys are shown at the bottom of the display screen. The F4 soft key is not operational in the Volts DC mode, although the beeper does sound if the key is pressed.

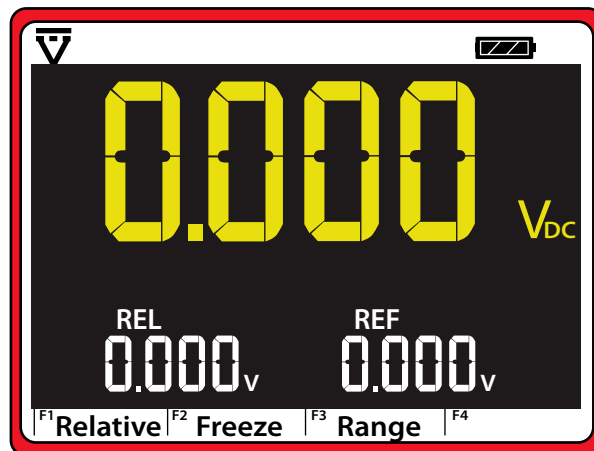


Figure 8-3 Sample Volts DC screen

F1 Key, Relative

The lower numbers shown in [Figure 8-3](#) do not display when you first select the Volts DC function. The DMM takes a “snapshot” of the current reading and holds it on the display when the F1 key is momentarily pressed. A “relative” value, which is continuously updated and shows the relationship between the initial reading and the most current reading, now displays as well. Additional momentary presses of the F1 key record new snapshots that replace the previous base reading. Press and hold the F1 key to cancel the relative function.

Alternate F1 Menu

There is a special alternate menu that is available by pressing and holding the F1 key for several seconds while in Volts DC mode (Figure 8-4). This menu allows you to modify three settings:

- Beeper functions
- Display backlighting
- Display screen colors

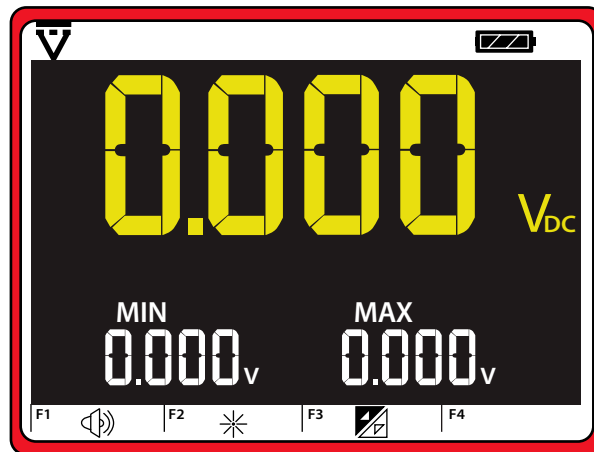


Figure 8-4 Sample active menu select mode screen

Each of these operations are explained below, a second long press of the F1 key returns the display to the normal mode. The F4 key is nonfunctional in the alternate menu mode.

Pressing **F1** from the alternate menu switches the internal beeper used for the continuity test and to indicate soft key pushes on and off. The beeper function remains “on” to indicate low battery conditions and other special functions like loss of contact with the remote device.

Pressing **F2** from the alternate menu changes the intensity of the LCD display backlight. Each key push advances to the next level of intensity, then returns to the lowest level once maximum brightness is reached. The backlight never turns completely off. There are five intensity levels for the backlight.

Pressing **F3** from the alternate menu switches between the two available combinations of screen background and character colors. One is light characters on a dark background and the other is dark on light.

F2 Key, Freeze

A press of the F2 key freezes, or so that the displayed value remains static. A second press of the F2 key returns to unit to normal operation. This function is available in normal and relative modes.

F3 Key and Range Key

Pressing the F3 and Range keys changes the measuring range. Measuring ranges vary by which function (Volts DC, Volts AC, Resistance, Auxiliary) is selected. A long press of the F3 or Range key returns to unit to auto-range operation. This function is available in normal and relative modes.

Min/Max Key

Press the Min/Max key and the display shows both the instantaneous voltage reading and the minimum and maximum voltages that occurred since the last time the key was pressed. See ["Sample active menu select mode screen," on page 71](#).

The displayed values continue to update until the Min/Max key is pressed again, then:

- A short press of the Min/Max key resets the readings
- A long press of the Min/Max key returns to normal Volts DC mode.

S Key, Special Functions

The S key is used to activate special time measurement functions available when sampling voltage. Each press of the S key advances to the next function in the following order:

1. The screen changes to show the frequency, period, and duty cycle of the test signal.
2. The screen changes to show the frequency, period, and pulse width of the test signal.



NOTE:

Press and hold the S key at any time to instantly return the display to a voltage reading.

In this special time measurement mode, the readings shown on the screen are integrated, or filtered. This means that the displayed values show average time-based measurements with great accuracy, but do not capture fast signal anomalies such as instantaneous “glitches” or timing shifts. However, these types of fast signal changes can be seen using the Graph key.

Graphing Voltage Measurement Screens

The VERDICT M2 can generate a graphical history of a voltage signal over time, which is called a histogram. Pressing the Graph button when operating in Volts DC or Volts AC range causes the display to change from a digital reading to a graphical display.

While viewing a histogram, the function keys operate as follows:

- **F1**—switches peak detection on and off
- **F2**—freezes and unfreezes the histogram (pauses and resumes data collection).
- **F3**—incrementally increases the measurement range. The **Range** key incrementally decreases the measurement range.
- **F4**—incrementally increases the timescale of the histogram. The **Graph** key incrementally decreases the timescale.

A digital value of the signal displays in the upper-right corner of the display while operating in graphing mode.

Graphing with Min/Max Function

In the Volts DC graphing function you can capture and store the minimum and maximum voltages by pressing the Min/Max soft key. The readings appear in the upper-left portion of the LCD. The VERDICT M2 device captures and reports very fast events (as fast as 50 microseconds) in this mode, which is only available in Volts DC.

Press the Min/Max key and the display shows both the instantaneous voltage reading (large characters) and the minimum and maximum voltages that occurred since the last time the key was pressed. The displayed values continue to update until the “Min/Max” key is pressed again. Then the values reset the readings on the display begin the process again. Press and hold the Min/Max key to cancel this function, and return to the normal volts DC mode.



To exit graph mode:

- Press and hold the **Graph** key for two seconds.

Graphing Time-Based Measurement Screens



To access time-based measurement graphs:

1. Press the **Graph** key.
2. Press the **S** key.

The VERDICT M2 is now in time-based measurement mode.

In this mode, the VERDICT M2 uses a specialized strategy called “cycle-by-cycle” (C-B-C) time-based measurements to capture signal glitches. To do this, the VERDICT M2 unit examines each cycle of the signal under test, calculates its period, duty cycle and pulse width, and generates a graphical history of that signal (called a histogram). Any significant variation of the signal is visible on the histogram.

When you initially enter this mode, the system shows frequency histograms (the default setting). A press of the S key switches the display from frequency to duty cycle. A second press of the S key switches the display from duty cycle for pulse width.

There three items displayed on the LCD in the graph mode:

- A histogram of the signal being measured displays across the screen
- The averaged result of the timing measurement appears on the upper-right side of the screen
- The minimum and maximum value readings display on the upper-left side of the screen (after first pressing the Min/Max key).

Range

A press of either the Range or F3 key takes the meter out of the automatic voltage scale function and allows you to change the voltage scale or resolution. Subsequent key presses switches the display between the available ranges. Press and hold the Range key to cancel this function and return to automatic range operation.

8.2.2 Volts AC

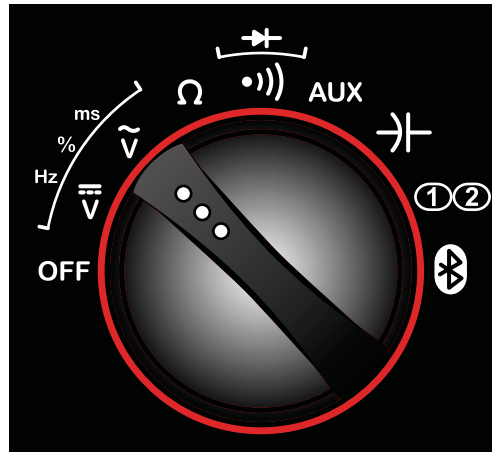


Figure 8-5 Volts AC selected

When sampling AC voltage the soft keys function the much the same as for DC voltage. However, there are some differences. Brief explanations are provided below, refer to ["Volts DC," on page 69](#) for more detailed descriptions.

F1 Key

The F1 key switches between normal and relative readings. A short push of the key resets the reading, a long push opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed voltage. A second press returns the display to normal mode.

F3 Key

Short pushes of the F3 and Range keys incrementally increase and decrease the selected measurement range respectively. These keys are active in both the standard Volts AC and histogram modes.

F4 Key

The F4 key is nonfunctional in this mode.

S Key

Pressing the S key activates the time management functions to display frequency, duty cycle, and pulse width. A long press of the key returns to the normal display mode.

Min/Max Key

Pressing the Min/Max key causes minimum and maximum readings to display along with the current value. A long press of the key returns to the normal display mode.

Range Key

A press of the F3 or Range keys changes the voltage scale or resolution of the display. Each key press incrementally advances through the available settings. A long press of the Range key returns to display to the automatic range.

Graph Key

Pushing the Graph key generates a histogram that graphically shows the various values of the voltage measurements taken.

The Range and F3 keys can be used to change the measurement range. When Range is pressed, the current histogram erases and a new graph starts building from zero.

Pressing the F4 and Graph keys while in Graph mode changes the sweep rate, or the time represented by the width of the screen.

A “long press” of the “Graph” key returns the unit to the normal “Volts AC” function.

8.2.3 Resistance

This setting allows you to measure the DC resistance to current in ohms. When sampling resistance the soft keys function much the same as for DC or AC voltage. Brief explanations are provided below, refer to ["Volts DC," on page 69](#) for more detailed descriptions.



Figure 8-6 Resistance selected

F1 Key

The F1 key switches between normal and relative readings. A short push of the key resets the reading, a long push opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed value. A second press returns the display to normal mode.

F3 Key and Range Key

A short push of the F3 or Range key changes the selected measurement range.

F4 Key and S Key

The F4 and S Keys are nonfunctional in this mode.

Min/Max Key

Pressing the Min/Max key causes minimum and maximum readings to display along with the current value. A long press of the key returns to the normal display mode.

8.2.4 Continuity and Diode Check

This setting allows you to perform circuit continuity tests, and perform a forward drop test to check the operation of a diode.

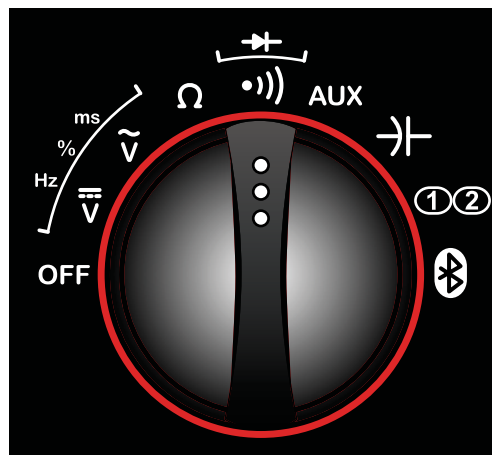


Figure 8-7 Continuity and diode check selected

The S key is the only soft key that is operational in continuity and diode mode. Pressing the S key switches between the continuity test and diode test settings. Continuity is the default setting.

When testing continuity, the M2 unit sounds a beep if a short circuit is detected (continuity between the two test leads).

When testing a diode, the M2 unit induces a current to the device under test and measures the resultant voltage drop across the device.

8.2.5 Auxiliary

This selection allows you to select between three auxiliary tests; current (amperes), temperature, and pressure. Approved probes, sensors, and transducers must be used in order to obtain valid measurements.

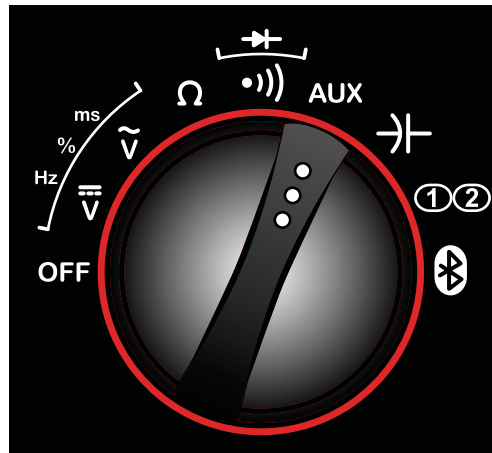


Figure 8-8 Sample auxiliary selected

Brief explanations of the soft key functions are provided below, refer to ["Volts DC," on page 69](#) for more detailed descriptions.

F1 Key

The F1 key switches between normal and relative readings. A short push of the key resets the reading, a long push opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed value. A second press returns the display to normal mode.

F3 Key and Range Key

The F3 and Range keys select the measurement range, which varies with the selected function:

- Current—switches the scale between available settings for AC Amp and DC Amp probes.
- Temperature—switches between displaying degrees Celsius and degrees Fahrenheit.
- Pressure—switches between displaying pressure as pounds-per-square-inch (PSI) and vacuum as inches-of-mercury (inHg).

F4 Key

The F4 key is nonfunctional in this mode.

S Key

The S key is used to switch between the three different test modes (amperage, temperature, and pressure) available in the auxiliary setting. Each key press advances to the next available mode.

Min/Max Key

Pressing the Min/Max key causes minimum and maximum readings to display along with the current value. A long press of the key returns to the normal display mode.

Graph Key

Pushing the Graph key generates a histogram that graphically shows the various values of the measurements taken.

The Range and F3 keys can be used to change the measurement range. When Range is pressed, the current histogram erases and a new graph starts building from zero.

Pressing the F4 and Graph keys while in Graph mode changes the sweep rate, or the time represented by the width of the screen.

A “long press” of the “Graph” key returns the unit to the normal “Auxiliary” function.

8.2.6 Capacitance

This selection is used to measure capacitance.

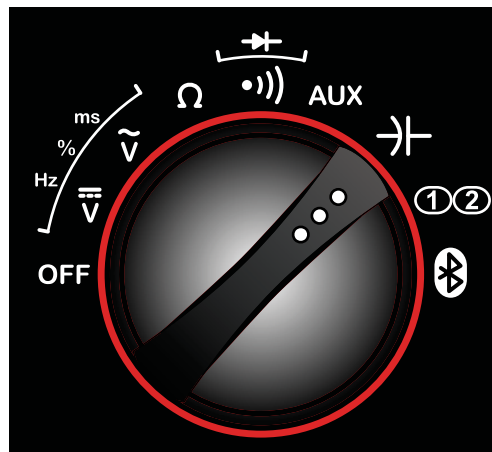


Figure 8-9 Sample capacitance selected

F1 Key

Relative readings are not available in this mode. A short push of the F1 key does cause a beep to sound, but the display remains unchanged. A long push of the F1 key opens the alternate menu.

F2 Key

A single press of the F2 key pauses, or freezes, the displayed value. A second press returns the display to normal mode.

F3 Key and Range Key

The F3 and Range keys select the measurement range.

F4 Key, S Key, Min/Max Key, and Graph Key

The F4, S, Min/Max, and Graph keys are nonfunctional in this mode.

8.2.7 Oscilloscope ①②

The data acquisition device has the ability to provide a two-channel oscilloscope, or waveform viewer. The viewer becomes active when the rotary switch is turned to the “scope” position.

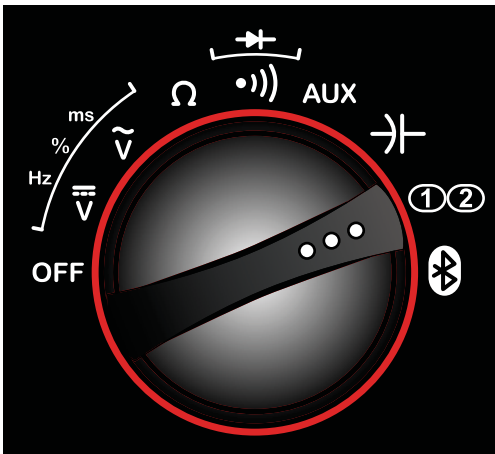


Figure 8-10 Sample scope setting

Soft key functions are unique when performing oscilloscope tests. In this mode there are seven available setting ranges for the F2, F3, and F4 keys. Pressing the F1 key scrolls up through the list of settings, and pressing the S key scrolls down through the list. The F1 area on the screen shows which of the six settings is currently active (Figure 8-11). Available scope functions are shown in the table below:

Setting	F1 Key	S Key	F2 Key	F3 Key	F4 Key
Display	Scroll up	Scroll down	Freeze	Scale	Time
Trigger			Slope	Level	Channel
Preset A			GCI&S†	LF AC†	HF AC†
Preset B			PCI&S†	LF DS†	HF DS†
Special			Peak	Invert	Coupling
Position			Move Ch1 Trace	Move Ch2 Trace	Not Used
Channel			Display Ch1	Display Ch2	Check scales
† See page 82 for acronym definitions					

Display Selections

With the scope in the display mode the soft keys perform the following functions:

- **F2**—the first press pauses data collection to allow closer examination of the waveform, the second press restores data collection.
- **F3 and Range**—each press of the F3 key advances up to the next available scale, which is the value of the voltage displayed vertically on the screen. The currently selected scale is shown at the top of the screen. The Range key moves incrementally down through the list of available scales.
- **F4 and Graph**—each press of the F4 key advances to the next timebase, or sweep rate, which is the time represented on the width of the display. The currently selected timebase is shown at the top of the screen. Use the Graph key to move incrementally down through the list of available time bases. Press and hold the F4 key to return to the default setting.

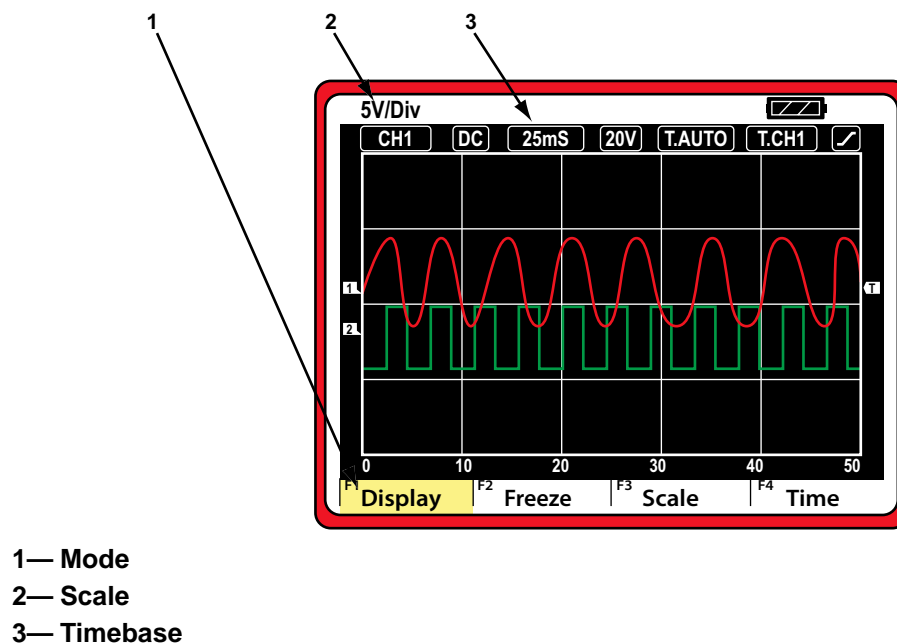
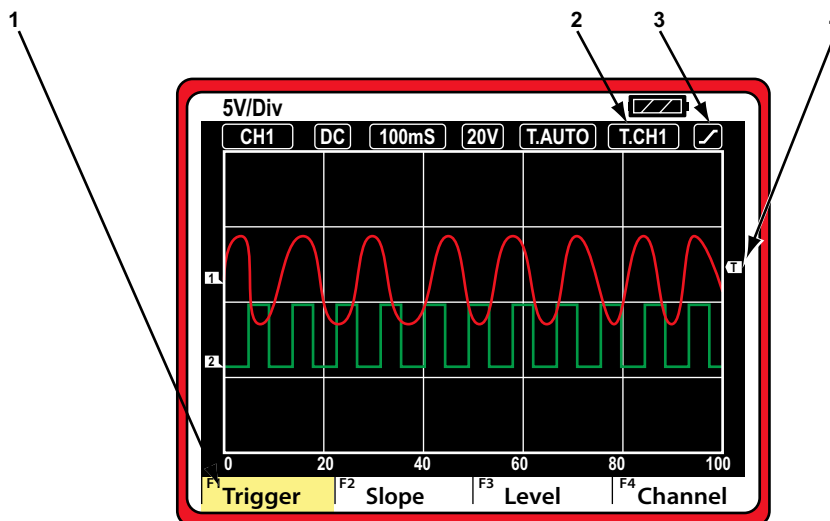


Figure 8-11 Sample display screen

Trigger Selections

Triggering allows you to set the scope so that it begins sampling and displaying a trace once predetermined signal conditions, or triggers, are met. Triggering produces a much more stable waveform. The trace always begins at the trigger point, so the image does not appear to flicker or drift as it updates.



- 1— Mode
- 2— Trigger channel
- 3— Trigger slope
- 4— Trigger level

Figure 8-12 Sample trigger screen

With the scope in the trigger mode the soft keys perform the following functions:

- **F2 Slope**—pressing the F2 key switches triggering back and forth between the rising (positive) edge and trailing (negative) edge of the waveform. A graphic in the upper-right corner of the display screen shows the currently selected slope.
- **F3 Level**—short presses of the F3 key incrementally increase the trigger voltage level. An indicator to the right of the screen graph shows the current trigger voltage level. Short presses of the Range key incrementally decrease the trigger voltage level. Press and hold either key (F3 or Range) to return to the default setting.
- **F4 Channel**—a press of the F4 key switches triggering between channel 1 (CH1) and channel 2 (CH2). The channel currently selected for triggering is shown at the top of the screen.



NOTE:

Triggering is not available when the timebase setting is between 1 second and 10 seconds.

Preset Selections

These options allow you to select from already configured scope setups for commonly tested items. Six preset configurations are available; three for Preset A and three for Preset B. These preset conditions are permanent and cannot be erased or modified. However, you can construct and store additional presets within the D7 Display Device as explained in the Scope and Multimeter chapter of this manual.

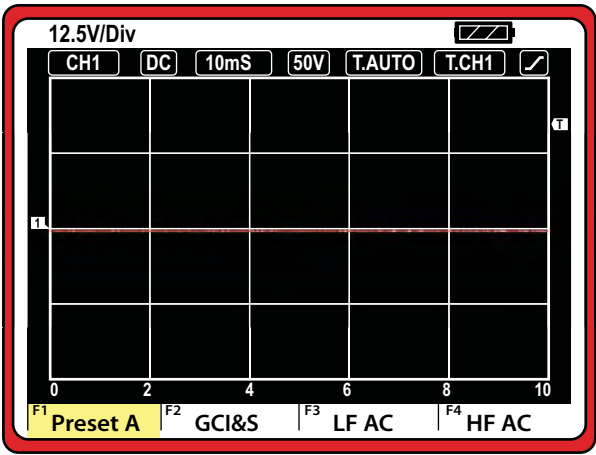


Figure 8-13 Sample preset (Preset A, F2) screen



To select a preset:

1. Use the **F1** or **S** key to navigate to either Preset A or Preset B.
2. Press **F2**, **F3**, or **F4** to load the desired preset.

The selected preset loads and the meter is ready for testing.

The F2, F3, and F4 fields on the screen are acronyms for the type of test the preset is configured to perform. Interpret as follows:

- **Preset A:**
 - CGI&S—ground controlled injectors and solenoids
 - LF AC—low frequency alternating current signals
 - HF AC—high frequency alternating current signals
- **Preset B:**
 - PCI&S—power controlled injectors and solenoids
 - LF DS—low frequency digital signals
 - HF DS—high frequency digital signals

Values for the available presets are shown in the table below.

Selection	Position	Timebase	Scale	Trigger	Coupling	Slope
Preset A	F2 (CGIS)	10 mS	50 Volts	8 Volts	DC	Negative
	F3 (LF AC)	50 mS	20 Volts	0 Volt	AC	Positive
	F4 (HF AC)	10 mS	20 Volts	0 Volt	AC	Positive
Preset B	F2 (PCI&S)	10 mS	50 Volts	8 Volt	DC	Positive
	F3 (LF DS)	50 mS	20 Volts	3 Volt	DC	Positive
	F4 (HFDS)	10 mS	20 Volts	3 Volt	DC	Positive

Special Selections

The Special settings allow you to alter the way the trace is displayed in order to readily spot signal anomalies and to compare signals. A short push of the F2, F3, or F4 key activates the indicated special mode, a long push of the key cancels the special mode.

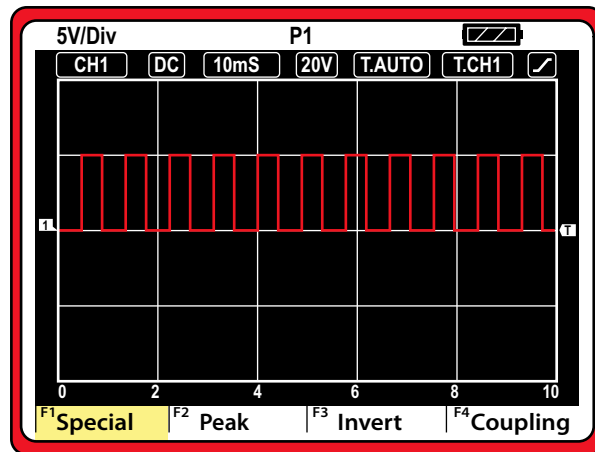


Figure 8-14 Sample special selections screen with peak capture on

Peak

Pressing the F2 key switches on the peak capture function, which allows you to see very fast signal transitions or glitches. When peak capture is active, “P1” displays at the top of the screen. During normal operation, the scope collects just enough data samples to plot a waveform across the screen. When peak is active the scope samples data at the maximum highest rate, which collects more data than what is needed to simply construct a waveform across the screen. Therefore, any signal glitches or fast events are captured.

Invert

Pressing the F3 key inverts, or switches, the polarity of the signal trace so that it appears upsidedown on the screen. This is typically used to sample amperage or high-voltage signals.

Coupling

Pressing the F4 key switches the input to the meter from DC coupling (default) to AC coupling. In this mode the average value of the waveform is subtracted so that small signal variations become apparent. AC coupling blocks the DC portions of an input signal in order to amplify the AC portions without driving them off of the screen. Use for viewing alternator ripple or fuel pump amperage.

Position Selections

The Position selections allow you to reposition the baselines of the channel 1 and channel 2 traces vertically on the screen.

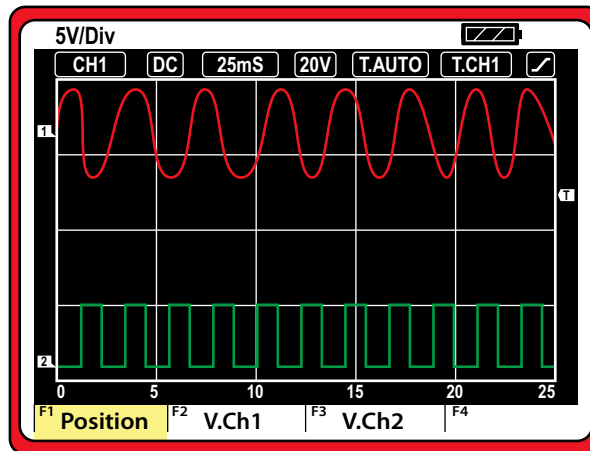


Figure 8-15 Sample screen with both traces repositioned

Channel 1 Trace

Use the F2 and Min/Max keys to reposition the channel 1 trace as follows:

- Short pushes of the **F2** key moves the trace incrementally up.
- A long push of the **F2** key places the trace at the midpoint of the scale.
- Short pushes of the **Min/Max** key moves the trace incrementally down.
- A long push of the **Min/Max** key places the trace at 10% of the scale.

Channel 2 Trace

Use the F3 and Range keys to reposition the channel 2 trace as follows:

- Short pushes of the **F3** key moves the trace incrementally up.
- A long push of the **F3** key places the trace at the midpoint of the scale.
- Short pushes of the **Range** key moves the trace incrementally down.
- A long push of the **Range** key places the trace at 10% of the scale.

Channel Selections

The channel selection mode allows you to switch the trace on and off. The F2 key controls the channel 1 trace and the F3 key controls the channel 2 trace. Pressing the key the first time turns this channel “off” and the sweep signal is removed from the display. Pressing the key a second time puts this channel back onto the display. The previous characteristics for this channel are saved during this process. The indicator at the base of the screen appears as inverse video (white lettering on a black background) when a channel is on.

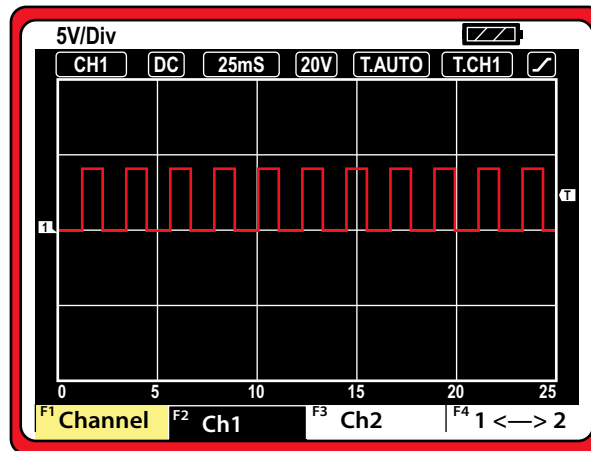


Figure 8-16 Sample screen with channel 1 on and channel 2 off

Bluetooth Discovery Selection

A special Bluetooth Discovery mode is available when operating in oscilloscope mode. Bluetooth Discovery allows the M2 unit to be “paired” and connected to a host computer. This function is only used when the VERDICT M2 has not been previously paired with a host, or if it becomes necessary to pair with a new host. The VERDICT M2 can only be paired with one host at a time.

When Bluetooth Discovery is enabled, the VERDICT M2 seeks a compatible host computer, such as the D7 Display Device. If a compatible device is within range, the VERDICT M2 recognizes its presence, and can initiate pairing if so instructed by the operator. The pairing function requires active participation of an operator. Once pairing has been established, the operator must exit from the Bluetooth Discovery mode.



To pair the M2 to a D7 Display Device:

1. Power on the D7 Display Device.
2. Set the VERDICT M2 Rotary Switch to the oscilloscope position.
3. Press and hold the **F1** key of the VERDICT M2 to open the alternate menu.

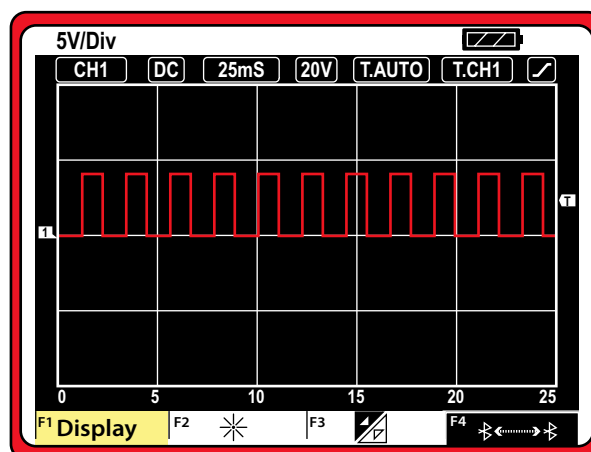


Figure 8-17 Sample Bluetooth Discovery selected

An alternate menu option for the F4 key is now available.

4. Press the **F4** key to activate Bluetooth Discovery.

The F4 field on the screen switches to inverse video (white on black) when the Bluetooth Discovery mode becomes active.

5. With the Bluetooth Discovery active, turn the M2 Rotary Switch to the Remote Functions position ([Figure 8-18](#)).

The VERDICT M2 is now ready to be paired with a display device. If the radio name and the security code of the VERDICT M2 are recognized as legitimate by the display device, the two devices automatically pair, bond and connect.

6. After VERDICT M2 has been successfully paired, turn the M2 Rotary Switch to the oscilloscope position.

7. Press and hold the F1 key to open the alternate menu.

8. Press the F4 key to switch off Bluetooth discovery mode.

The F4 field on the screen switches to normal video (black on white) when the Bluetooth Discovery mode is inactive.

Once the VERDICT M2 is paired with a display device, additional pairing is not necessary. Although the discovery mode has been disabled, the two-paired devices automatically seek and find each other when they are powered on. The VERDICT M2 becomes “invisible” to other Bluetooth devices whenever discovery is disabled.

8.2.8 Remote Functions

With the Rotary Switch in the Remote Functions position the VERDICT M2 attempts to communicate with a host computer. This could be either a display device with which the VERDICT M2 has been paired, or one that it wants to pair to.

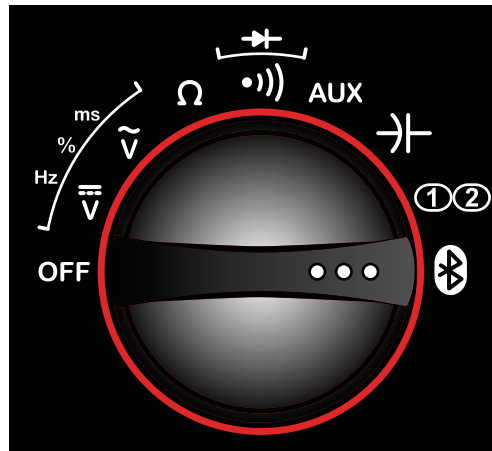


Figure 8-18 Sample remote functions selected

If the VERDICT M2 has been paired with a display device, it automatically connects to it. Once connected to a display device the front panel keys on the VERDICT M2 become inoperative. All controls of the VERDICT M2 are transferred to the host computer. Turning the Rotary Switch off of the Remote Functions position returns control to the VERDICT M2 and the front panel keys regain their functionality.

8.3 Updating the Software

The VERDICT M2 software can be updated using the VERDICT D7 Display Device. When the display device is connected to the internet it automatically searches for software updates for all of the VERDICT components. Any updates that are found are stored on the device, but must be installed to complete the process. This section describes updating the VERDICT M2 software.



To update the software:

1. Connect the VERDICT M2 and D7 Display Device to AC power using their AC/DC Power Supply units to prevent loss of power during the programming process.
2. Power on the VERDICT D7 Display Device.
3. Verify the VERDICT M2 and D7 Display Device are paired.
4. Power on the VERDICT M2 unit and set the Rotary Switch to the **Remote Functions** position.
5. From the D7 Display Device Home screen, select **Scope Multimeter**.
6. Select **Lab Scope** from the D7 Profile screen.
7. Select **2 Channel Lab Scope** from the D7 Lab Scope screen.

A message box opens in the lower-right corner of the scope screen if there is a software update is available ([Figure 8-19](#)).



Figure 8-19 Sample update available message

The message box only remains on the screen momentarily, then disappears. Tap the **Record** button on the Record/Playback toolbar to bring the message box back if it closes.

8. Tap on the Message Box.
The program initiation screen opens ([Figure 8-20](#)).

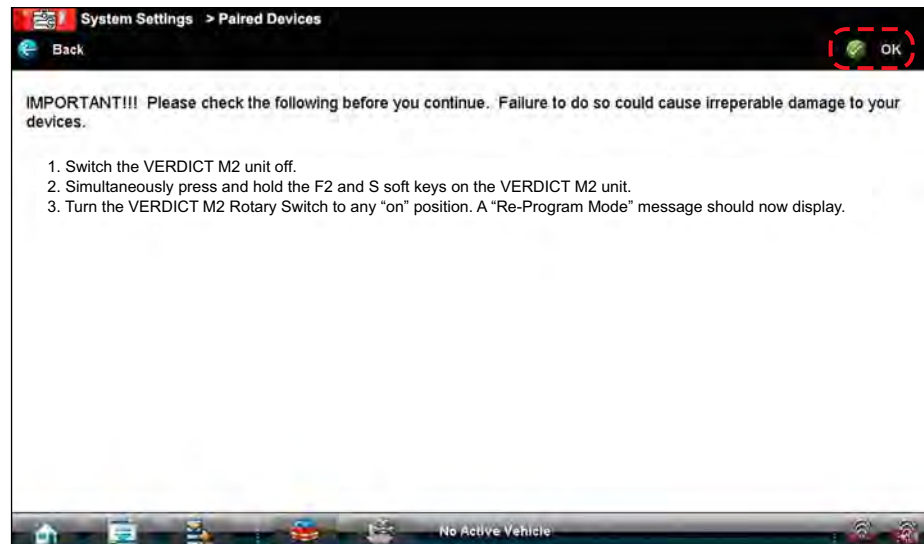


Figure 8-20 Sample initiation screen

9. Follow the screen instructions to place the VERDICT M2 into Re-Program Mode:
 - a. Switch the VERDICT M2 unit off.
 - b. Simultaneously press and hold the **F2** and **S** soft keys on the VERDICT M2 unit.
 - c. Turn the VERDICT M2 Rotary Switch to any "on" position.

The VERDICT M2 display should now show a Re-Program Mode message.

10. Tap the **OK** button on the D7 Display Device toolbar to begin programming.
 The update programming takes about five minutes, then the Home screen opens on the display device. Create a backup of the VERDICT M2 software to complete the process.

8.3.1 Creating a Software Backup

A backup copy of the newly updated software can be created and stored on the VERDICT M2. This copy can be used in the unlikely event that the original software becomes corrupted.



To backup the software:

1. Power off the VERDICT M2 unit.
2. Power on the VERDICT M2 unit and set the Rotary Switch to the **Volts DC** position.
3. Simultaneously press and hold the **F2** and **S** soft keys for two seconds.
 A "set memory recovery" message displays.
4. Press the Range soft key to initiate the backup.
 The screen display returns to the Volts DC screen once the procedure is complete. Both tools are now ready for use.

When used in conjunction with the VERDICT M2 Data Acquisition Device the Scope Multimeter module provides all the tools needed for performing electrical and electronic circuit tests and for monitoring signals and circuit activity. The Scope Multimeter works interactively with other modules. Selecting “View Meter” from a Component Test or Scanner test launches the Scope Multimeter module.

The M2 Data Acquisition Device is designed to work with the high-voltage hybrid vehicle batteries and circuits, which makes it a Measurement Category III and IV meter and raises additional safety concerns. For your safety, adhere to the safety messages posted below and those in the accompanying *Important Safety Information*.

WARNING

Risk of electrical shock.

- **This product is intended for Measurement Category III (1000V) and IV (600V).**
- **Do not exceed voltage limits between inputs as indicated on the rating label.**
- **Use extreme caution when working with circuits that have greater than 40 volts DC or 24 volts AC.**
- **Do not connect Inductive RPM Pickup, Secondary Ignition Clip-on Wire Adapter, or any other probe to a damaged or un-insulated conductors.**
- **Always wear properly rated rubber insulated gloves when required or appropriate, particularly when working with voltages exceeding 40 volts DC or 24 volts AC.**
- **Use only appropriate (Category III or IV) Snap-on components, such as test leads, scope leads and auxiliary components with meter and scope products. Do not use aftermarket “equivalents” or alternate leads of unknown origin.**
- **Use only Snap-on suggested components that are in good working order. Do not use components that show extreme wear or are visibly damaged. Make sure the components are properly rated for the task.**
- **Always examine the instrument for signs of damage before use. Do not use devices that show cracks or other defects that may allow for high voltage exposure.**

Electrical shock can cause personal injury, equipment damage, or circuit damage.

CAUTION

Risk of equipment or circuit damage.

- **Read the Safety Information provided for important warnings on the use of this product**
- **Disconnect test leads from any circuit being tested before changing functions. Always disconnect the live test lead before disconnecting the common test lead.**
- **Never perform resistance, diode, or polarity tests on a live circuit.**
- **Unless specifically directed by the test procedure, make sure the ignition is off before connecting or disconnecting connectors or any vehicle electrical terminals.**
- **Remove the amp probe when not in use.**
- **Do not create an electrical connection between battery terminals with a jumper wire, or your scopes and/or meters.**
- **Do not ground any electrical terminal that has or may have power.**
- **Do not allow battery gases or acid to contact tester housing.**

Improper use can cause equipment or circuit damage.

9.1 Getting Started

The Scope and Multimeter module enables the VERDICT to function as a digital multimeter (DMM), a graphing multimeter, and a 2-channel oscilloscope when the Display Device is wirelessly linked to the Data Acquisition Device.

9.1.1 Capabilities

The following tables detail the software and hardware capabilities.

Table 9-1 *Multimeter*

Function	Range	Resolution	Accuracy	Impedance/ Protection
Volts DC	40mV	0.01mV	±(1.0% of reading + 3 digits)	10M Ohm
	400mV	0.1mV		
	4V	0.001V		
	40V	0.01V		
	400V	0.1V		
	1000V	1V	±(1.5% of reading + 3 digits)	
Volts AC	400mV	0.1mV	±(1.5% of reading + 4 digits)	10M Ohm
	4V	0.001V		
	40V	0.01V		
	400V	0.1V	±(2.0% of reading + 4 digits)	
	1000V	1V		
Resistance	40 Ohm	0.01 Ohm	±(0.75% of reading + 5 digits)	600V DC or Peak AC
	400 Ohm	0.1 Ohm	±(0.5% of reading + 3 digits)	
	4k Ohm	0.001k Ohm		
	40k Ohm	0.01k Ohm		
	400k Ohm	0.1k Ohm	±(0.75% of reading + 5 digits)	
	4M Ohm	0.001M Ohm		
	40M Ohm	0.01M Ohm		
Capacitance	40nF	0.01nF	±(3.0% of reading + 15 digits)	600V DC or Peak AC
	400nF	0.1nF		
	4uF	0.001uF		
	40uF	0.01uF		
	400uF	0.1uF		
	4mF	0.001mF	±(5.0% of reading + 15 digits)	
	40mF	0.01mF		
Frequency	40Hz	0.01Hz	±(0.5% of reading + 2 digits)	N/A
	400Hz	0.1Hz		
	4kHz	0.001kHz		
	40kHz	0.01kHz		
	400kHz	0.1kHz		
	2MHz	0.001MHz		
Duty Cycle	0.1 — 99.9%	0.1%	N/A	N/A
Pulse Width	0.1 — 99.9%	0.1%	N/A	N/A
Diode Test	3V*	N/A	Range = 2V	N/A
Continuity	3V*	N/A	Threshold = 0.1%	N/A
* Test voltage.				

* Test voltage.

Table 9-2 Scope

Function	Range	Accuracy/Comments
Signal Measurement	Ch. 1—red banana jack Ch. 2—green banana jack	Each channel input is referenced to common ground input (GND—black port)
Sample Rate	20 mega samples per second	Continuous sampling, MSPS = mega samples per second
Update Rate	Real time	Real time
Sweep Rate	50 μ S to 20 S	In a 5 step sequence
Band Width	2 MHz	–3 db point
Resolution	8 bit	
Coupling	AC/DC	
Input Impedance	10 MOhm	Channel 1 and 2

9.1.2 Leads and Adapters

The Scope Multimeter uses standard safety banana plugs that are compatible with many accessories. The various leads, clips, and adapters that are supplied with or available for the VERDICT M2 unit explained in this section.

IMPORTANT:

When removing leads from their sockets, do not pull on the wire because it can damage the leads. Pull on the plug.

Channel 1 Lead



Figure 9-1 Red Channel 1 Lead

The shielded red lead with an integrated probe is used for Channel 1 (Figure 9-1). The lead color matches the color of socket 1 on the Data Acquisition Device and of trace 1 on the test screens.

Channel 2 Lead



Figure 9-2 Green Channel 2 lead

The shielded green lead (Figure 9-2) with an integrated probe is used for Channel 2. The lead color matches the color of socket 2 on the Data Acquisition Device and the color of trace 2 on the test screens.

Common Lead



Figure 9-3 Red Channel 4 lead

The black lead (Figure 9-3) with an integrated probe is used when a separate common, or ground, connection is needed. The lead color matches the color of the COM socket on the Data Acquisition Device.

Alligator Clips

Three insulated alligator clips that attach to the test leads are included. The insulator boots are colored to match each test lead. Alligator clips attach to the probe end of the test lead.



To install an alligator clip:

1. Remove the collar from the probe by threading it counterclockwise off of the tip (Figure 9-4). Store the collar in a safe place while not in use.

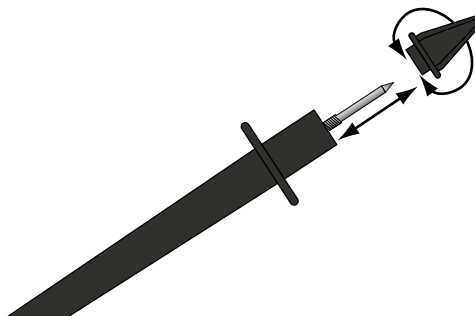


Figure 9-4 Probe collar

2. Fit the tip of the probe into the alligator clip and thread the clip onto the probe.

Low Amp Current Probe (optional)

The optional Low Amp Current Probe (Figure 9-5) provides accurate and reliable non-intrusive testing of ignition coils, fuel injectors, fuel pumps, relays, electric motors, and parasitic draw. Use to measure current from 10 mA to 40 Amps with a resolution of 1 mA.



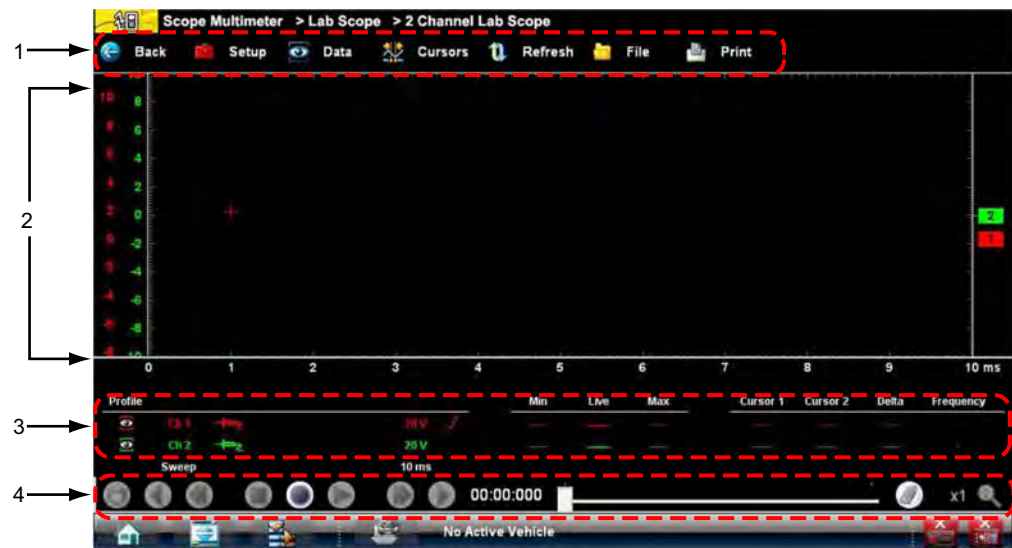
Figure 9-5 Low Amp Current Probe

Navigation

The following section describes how to navigate the screen interface when viewing on the Display Device. When using the Data Acquisition Device as a stand-alone test meter refer to "M2 Data Acquisition Device Controls and Features," on page 19 for navigation instructions.

9.1.3 Screen Layout

The scope multimeter screens typically include the following sections (Figure 9-6):



- 1— **Scope Multimeter toolbar**—allows you to configure the tool for the type of test and to adjust the settings for each channel, or trace.
- 2— **Main body**—displays test results. Options on the toolbar let you select how tests display on the screen.
- 3— **Trace Details**—displays trace sampling conditions, which can be adjusted or switched through the touch screen.
- 4— **Record/Playback Control toolbar**—allows you to record and navigate paused data

Figure 9-6 Scope Multimeter screen layout

Scope Multimeter Toolbar

The Scope Multimeter toolbar is used to set up the tool for testing and to configure the settings for each trace. The table below gives brief descriptions of the control buttons on the toolbar:

Table 9-3 Scope Multimeter toolbar buttons (sheet 1 of 2)


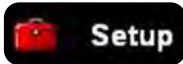


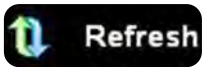


Name	Button	Description
Back		Returns to the previously viewed screen.
Setup		Opens a dialog box that allows you to select personal preferences for viewing and saving data.

Table 9-3 Scope Multimeter toolbar buttons (sheet 2 of 2)

Name	Button	Description
Data		Switches the trace information displayed at the base of the screen on and off.
Cursors		Opens a dialog box that allows you to switch cursors on and off, and to reposition them on the screen.
Refresh		clears the minimum and maximum digital values and updates the viewing screen.
File		Opens a dialog box that allows you to select options for saving data.
Print		Opens a dialog box that allows you to configure and print data.

Main Body of the Screen

The main body of the screen varies depending on what display options have been selected. Two traces, along with digital readouts of current signal values, signal status and triggering conditions, can be displayed simultaneously on the main body of the screen. Adjustments to the display are made through the scope toolbar as explained above.

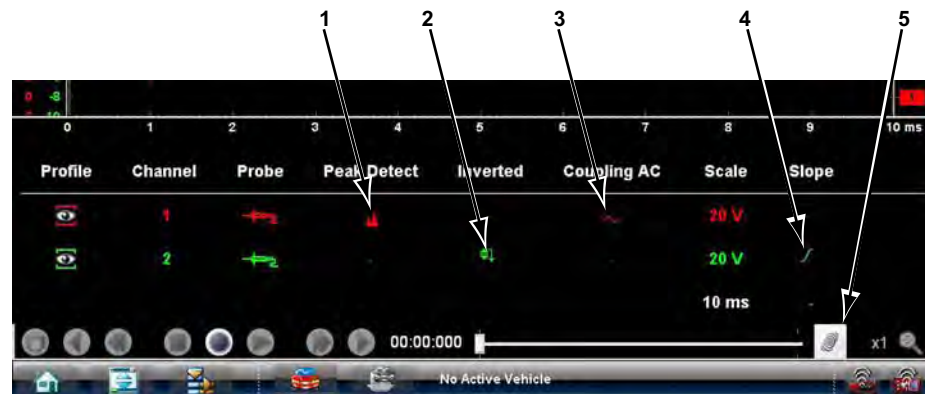
Each trace is displayed as voltage over time on a standard oscilloscope screen. Voltage level is recorded on the vertical, or “y”, axis and time is presented on the horizontal, or “x”, axis of the screen. Values are shown for each graduation on the scales.

When using the pressure transducers, the pressure the transducer senses is converted into a voltage signal. However, the values are shown as pressure on the screen rather than voltage. Similarly, when using the optional Low Amp Current Probe the amperage sensed is converted to a voltage signal for processing, but displayed as amperage on the screen.

Trace Details

The Trace Details section displayed at the base of the screen can be used to quickly adjust sampling characteristics for capturing the trace. The Trace details can be hidden by selecting the **Data** button on the toolbar.

The Touch and Grow button on the Playback toolbar expands the data viewing area of the screen and allows you to change the configuration settings for each individual trace. Adjustments are made by tapping the item to be changed on the touch screen. A dash (–) indicates a function that is not selected, and an icon displays to indicate an active function ([Figure 9-7](#)).



- 1— Peak Detect on
- 2— Inverted trace
- 3— Coupling AC on
- 4— Trigger set on the rising edge
- 5— Touch and Grow button

Figure 9-7 Sample Touch and Grow display

The following trace adjustments and settings are available:

- **Profile**—switches the trace for the selected channel on and off.
- **Probe**—opens a dialog box that allows you to select the type of test probe being used.
- **Peak Detect**—maximizes the signal sampling rate in order to capture fast events, such as spikes, glitches and other anomalies, that may normally be undetected.
- **Inverted**—switches the polarity of the displayed signal.
- **Coupling AC**—subtracts the average value of the waveform by blocking the DC portion of an input signal in order to amplify the AC portion. This allows small variations in the trace to become visible.
- **Scale**—opens a dialog box that allows you to select the scale, which is the total value displayed on the vertical axis of the display.
- **Slope**—only active when a trigger is set, indicates whether the trigger is set to activate on the rising or falling edge of the trace. Tapping the slope icon switches the slope.

Record/Playback Control Toolbar

The record/playback control toolbar at the base of the screen is used for recording data and for reviewing paused data files. Use the stylus or your finger tip to activate the buttons. A position counter in the toolbar displays a numerical value of where the current screen is in relation to the entire recorded file.

Use the slider in the middle of the toolbar to quickly move through paused data.

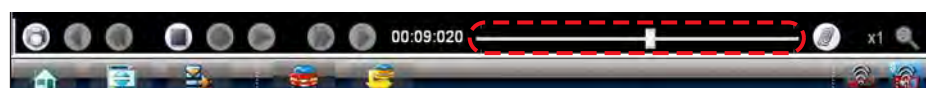








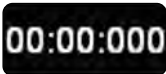




Figure 9-8 Sample data buffer slider

Use the toolbar buttons ([Table 9-4](#)) to more precisely navigate the data.

Table 9-4 Data buffer toolbar buttons

Name	Button	Description
Snapshot		Arms the VERDICT software to take a snapshot of the sampled data
Step Back		Moves to the previous point in the recorded data
Back 1Frame		Moves to the previous frame in the recorded buffer
Stop		Stops recording data
Record		Begins recording data
Play Recording		Plays the data recording in a continuous loop at actual speed
Forward 1 Frame		Moves to the next frame in the recorded buffer
Step Forward		Moves to the next point in the recorded buffer
Frame Counter		Indicates the data buffer frame currently displayed
Touch and Grow		Expands and collapses the Trace Detail area on the display screen to allow for easier finger tip control
Zoom		Increase or decrease the magnification of the graph

9.1.4 Making Selections

Most selections for setting up and operating the scope are made using a finger or the stylus and the scope toolbar. The cursor lines, the trace zero line, and the trigger point indicator (+) can be repositioned by selecting and dragging them in the main body of the screen.

There are two basic types of controls on the toolbar:

- Switches
- Dialog boxes

A Switch changes states when tapped with a finger or the stylus. Changes happen immediately as the selection is made.

A dialog box opens as a separate window on the screen and typically includes a number of choices. Changes happen immediately, however, the dialog box must be closed to return to the main window and continue. Make a selection to close the dialog box.

9.2 Operations

This section describes configuring the scope or meter and performing tests. Selecting “View Meter” from a Component Test or Scanner screen saves time by automatically configuring the scope or meter.

9.2.1 Starting the Scope and Multimeter

Use the following procedure to set up the scope multimeter for performing tests.



To start the scope multimeter:

1. Select the **Scope Multimeter** button on the VERDICT Home screen.
The Scope Multimeter main menu, a list of setup options, displays;
 - Lab Scope
 - Graphing Multimeter
 - Digital Multimeter
 - Presets
2. Tap to select the correct main menu option for the tests to be performed.
A submenu of scope or meter configuration displays, see below for additional information.
3. Tap to select the correct configuration for the tests to be performed.
The Scope Multimeter displays configured for the selected test.

Lab Scope Options

The following options are available for testing:

- 2 Channel Lab Scope
- Volts DC
- Low Amps (20)
- Low Amps (40)
- Ignition Probe
- 100 PSI Vacuum
- 100 PSI Pressure
- 500 PSI Pressure
- 5000 PSI Pressure

Graphing Multimeter Options

The following options are available for testing:

- Single Graphing Meter
- Volts DC
- Volts AC RMS
- Frequency
- Pulse Width
- Duty Cycle
- Ohms
- Low Amps (20)
- Low Amps (40)
- 100 PSI Vacuum
- 100 PSI Pressure
- 500 PSI Pressure
- 5000 PSI Pressure

Digital Multimeter Options

The following options are available for testing:

- Volts DC
- Volts AC RMS
- Ohms
- Diode/Continuity
- Capacitance
- Low Amps (20)
- Low Amps (40)

Presets

Presets are the personal meter settings that you have saved.

9.2.2 Scope and Multimeter Setup

The following sections explain how to adjust the scope and multimeter for the specific type of signal being sampled. Most of these setup operations are available from the toolbar.

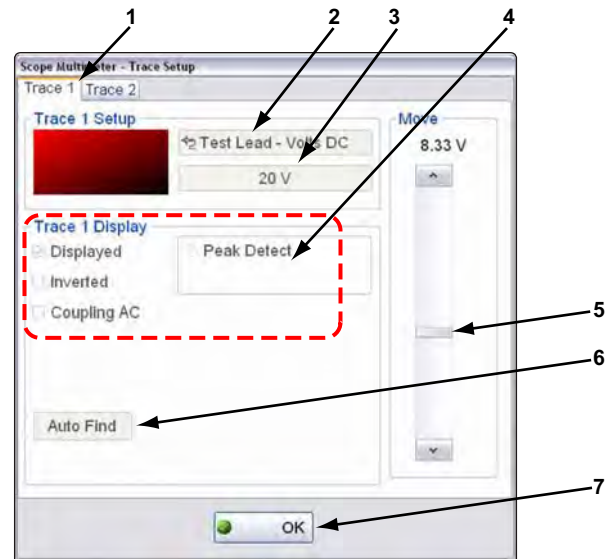
Trace Controls

The Traces controls are used to adjust individual characteristics of how the signal is sampled and displayed for each trace. The more commonly used trace settings can also be made from the Trace Details area of the touch screen (see ["Trace Details," on page 94](#)). Trace Details offers a shortcut to some of the operations described in the following sections.



To adjust trace controls:

1. Select **Setup** from the Scope Multimeter toolbar.
The Scope Multimeter Preferences dialog box opens
2. Double tap **Traces** to open the submenu.
3. Select the tab for the trace to be configured from the submenu
The traces dialog box displays (Figure 9-9).



- 1— Trace tabs
- 2— Trace Probe button
- 3— Trace Scale button
- 4— Trace characteristics check boxes
- 5— Baseline position
- 6— Auto Find button
- 7— OK button

Figure 9-9 Traces dialog box

4. Select the **Trace Probe** button to open the menu.
5. Highlight a probe on the list and tap **OK** close the window.
6. Select the **Trace Scale** button to adjust the vertical scale, of the display.
A dropdown menu opens, menu options vary depending upon which test lead is selected.
7. Select a trace scale option, then close the window.
8. Select or deselect the trace characteristic items as needed:
 - **Displayed**—this trace is on screen when checked, and not visible when not checked.
 - **Inverted**—signal polarity is reversed when checked, normal when not checked.
 - **Coupling AC**—check when sampling an AC signal, do not check for DC signals.
 - **Peak Detect**—use when trying to capture a fast event or signal glitch.
9. The scope samples the signal and internally calculates the best scale to fit the signal pattern on the screen when **Auto Find** is selected. If run on the same channel as the trigger, the trigger value is set halfway between the minimum and maximum values of the waveform.
10. The baseline position is the zero line of the trace, use the slider and arrows to adjust it.

11. Select **OK** to exit the dialog box.
12. Select **Back** twice to close the Scope Multimeter Preferences dialog box.

Sweep Controls

Sweep is the amount of time represented by the screen, or the horizontal scale of the display.



To adjust Sweep controls:

1. Select **Setup** from the Scope Multimeter toolbar.
The Scope Multimeter Preferences dialog box opens
2. Tap **Sweep** to open the sweep dialog box ([Figure 9-10](#))

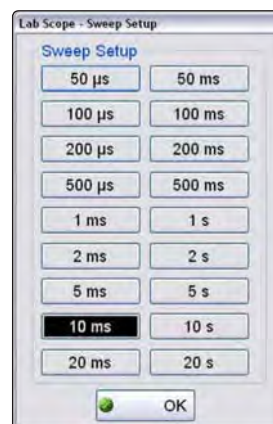


Figure 9-10 Sample Sweep Setup dialog box

3. Choose an option from the list.
4. Select **OK** to close the dialog box.
5. Select **Back** twice to close the Scope Multimeter Preferences dialog box.

Trigger Controls

Triggering allows you to set the scope so that it begins sampling and displaying a trace once predetermined signal conditions, or triggers, are met. Triggering produces a much more stable waveform. The trace always begins at the trigger point, so the image does not appear to flicker or drift as it updates. There are three modes of triggering:

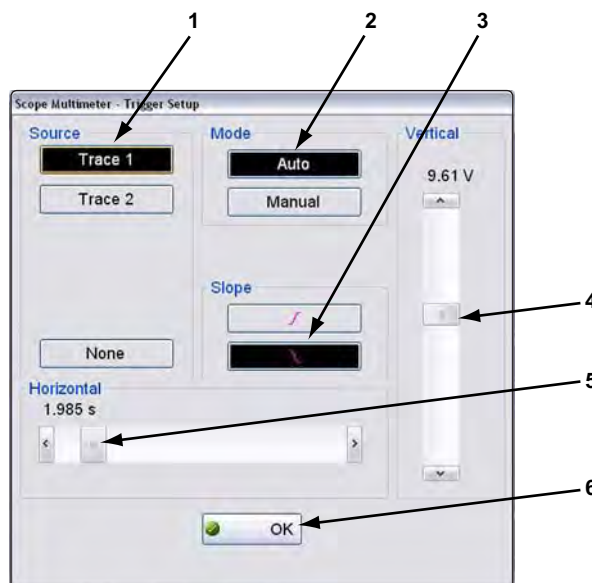
- **Auto**—this automatic triggering mode is the default setting that either constructs the trace independently of the trigger point or begins the trace as it crosses the trigger.
- **Manual**—often called normal mode, this option allows the user to set a triggering point and the trace does not begin to display until the signal reaches the trigger point.
- **None**—often called Histogram, this is a “no triggering” mode that is automatically engaged whenever a timebase, or sweep, between 2 seconds and 20 seconds is selected. *Triggering is prevented at slower sweep rates to eliminate screen update delays caused by the way VERDICT buffers data in order to capture rapidly occurring signal glitches.*

The trigger point is indicated by a plus sign (+) on the scope grid. The plus sign can be dragged across the grid with your finger or the stylus to roughly position it. The trigger controls allow you to precisely position the trigger.



To adjust trigger controls:

1. Select **Setup** from the Scope Multimeter toolbar.
The Scope Multimeter Preferences dialog box opens
2. Tap **Trigger** to open the Trigger Setup dialog box (Figure 9-11).
3. Use the dialog box controls to establish the position for triggering.
4. Select **OK** to close the dialog box.
5. Select **Back** twice to close the Scope Multimeter Preferences dialog box.



1— Source—selects the triggering event:

- Trace 1—sets conditions for the channel 1 signal.
- Trace 2—sets conditions for the channel 2 signal.
- None—switches triggering off.

2— Mode—sets the method of triggering:

- Auto (automatic)—if a trigger is found, the waveform displays. If a trigger is not found after several seconds, the waveform and a “trigger not found” message displays.
- Manual—if a trigger is found, the waveform displays. If a trigger is not found nothing displays (no waveform and no message).

3— Slope—sets triggering to the rising or falling edge of the signal.

4— Vertical position—moves the trigger position up and down on the grid.

5— Horizontal position—moves the trigger timing left and right on the grid

6— OK—exits Trigger Setup

Figure 9-11 Trigger controls

View Controls

Use the view controls to set display attributes.



To adjust view controls:

1. Select **Setup** from the Scope Multimeter toolbar.
The Scope Multimeter Preferences dialog box opens.
2. Tap **View** to open a submenu.
Three types of adjustment are available on the submenu:
 - **Display**—use to adjust what information displays and how it appears
 - **Layout**—use to set how many and how the traces display on the screen
 - **Units**—use to adjust time and voltage interval settingsSelecting from the submenu opens a dialog box for that item.
3. Make dialog box selections as needed.
4. Select **OK** to close the dialog box.
5. Select **Back** twice to close the Scope Multimeter Preferences dialog box.

Display Settings

Selecting **Display** from the View submenu opens the Display dialog box (Figure 9-12).



Figure 9-12 Sample Display dialog box

The following options are available from the Display dialog box:

- **Show RPM**—adds a digital engine speed readout near the top of the screen (Figure 9-13).



Figure 9-13 Sample Show RPM selected

- **Show Grid**—switches grid lines on the screen off and on (Figure 9-14).

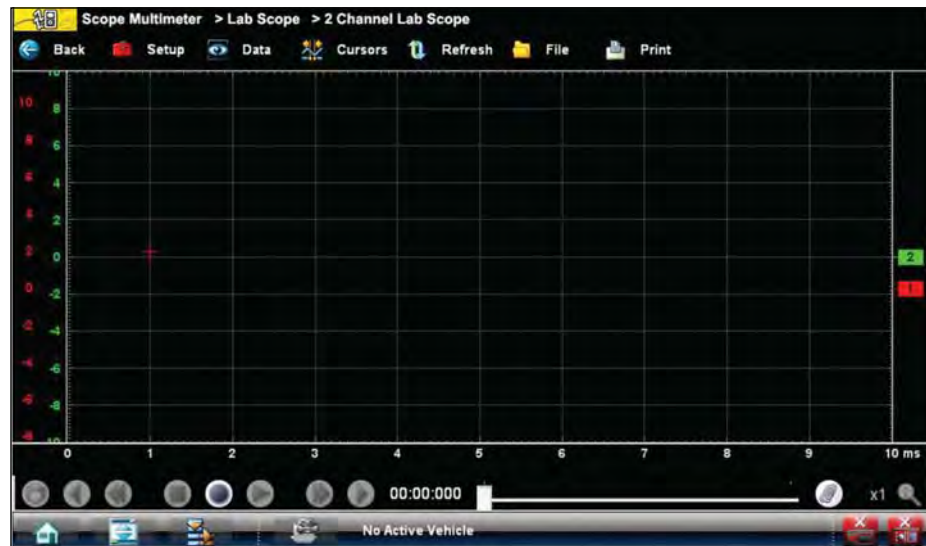


Figure 9-14 Sample grid selected

- **Invert Colors**—switches the screen background to white, this saves ink when printing.

Layout Settings

The selected radio knob on the Layout dialog box shows which setting is active:

- **1 Window**—shows all traces on the same screen.
- **2 Windows**—shows two separate horizontal traces, one below the other
- **2 Windows**—shows two separate vertical traces, side-by-side.

Units Settings

The Units dialog box allows you to switch between Full Scale or Per Division settings for the trace setup and the display settings. Selecting Full Scale configures the units to the full viewing area of the screen, while Per Division adjusts the units to a single division (one tenth) of the screen.



Figure 9-15 Sample View Units dialog box

The selected radio knob on the Units dialog box shows which setting is active. Use the stylus to switch between settings (Figure 9-15).

Setup Controls

Basic tool settings are adjusted here.



To adjust setup controls:

1. Select **Setup** from the Scope Multimeter toolbar.
The Scope Multimeter Preferences dialog box opens
2. Select **Setup** from the dialog box.
A submenu of options displays:
 - **Units**—use to set how measurement values display, US standard or metric
 - **Snapshot**—use to adjust the percentage of data captured following a trigger event
 - **Ignition**—use to configure the optional ignition scope and to display RPM values
 Selecting from the submenu opens a dialog box for that item. Dialog box options for each item are discussed in the following sections.
3. Make dialog box selections as needed.
4. Select **OK** to close the dialog box.
5. Select **Back** twice to close the Scope Multimeter Preferences dialog box.

Units

The units of measurement can be changed between US customary or metric units of measure for pressure and vacuum readings. Selecting Units opens the Setup dialog box. The selected radio knobs on the Setup dialog box shows which setting is active. (Figure 9-16)



Abbreviation	Description
bar	bar
inHg	inches of mercury
kg/cm2	kilograms per centimeter squared
kPa	kilopascal
mmHg	millimeters of mercury
psi	pounds per square inch

Figure 9-16 Sample Setup Units dialog box

Snapshot

The Snapshot tab of the Setup dialog box opens a window that allows you to select how much data is captured after a triggering event (Figure 9-17).



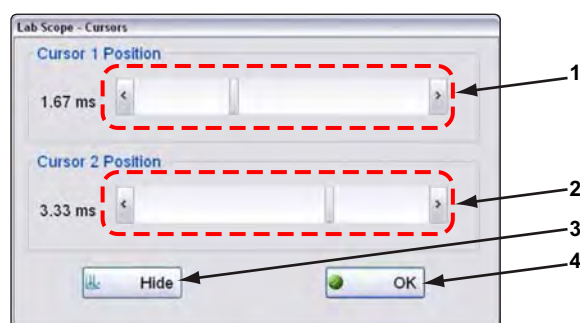
Figure 9-17 Sample Snapshot dialog box

Selections range from ten to ninety percent in increments of ten, the current setting is highlighted. Select a button, then select **OK** to close the dialog box.

Refer to "Trigger Controls," on page 100 for information on how to setup a trigger.

Cursor Controls

The cursor controls include a Show Cursors check box plus a slide control and arrows for moving the cursor position left or right. Select **Cursors** from the toolbar to open the Cursors dialog box (Figure 9-18).



- 1— Cursor 1 controls
- 2— Cursor 2 controls
- 3— Hide button
- 4— OK button

Figure 9-18 Cursor controls

Cursor 1, the top slider and arrows, is the left-hand cursor on the screen. Cursor 2, the lower set of controls, is the right-hand cursor on the screen. Drag the slider or tap the arrows to position the cursors. Each tap of the stylus moves the cursor incrementally in the direction of the arrow.

Select **OK** apply the changes and close the dialog box.

Select **Hide** to conceal the cursors and close the dialog box.

Refresh Controls

Selecting the **Refresh** button from the Scope Multimeter Toolbar clears the minimum and maximum digital values and updates the viewing screen.

File Controls

Selecting File from the toolbar opens a window with a menu of save options:

- **Save Configuration**—saves the current setup values as a preset.
- **Save Single Frame**—saves the data currently on the screen only.
- **Save All Frames**—saves the current screen plus all the data stored in the buffer.

Selecting a menu option opens the Save As dialog box and the virtual keyboard. Follow the screen prompts to name and describe the file you are saving. Basic information from the Vehicle ID, such as year, make, and model, is saved along with the file. Select **OK** to close the dialog box.

Once a configuration is saved, it becomes available from the **Presets** option on the Scope Multimeter Main menu. Saved files, single frame or all frames, are stored in the Scope Multimeter Data Folder and can be retrieved through the **Data Manager** on the VERDICT Home screen.

Print Controls

Selecting Print from the toolbar opens a standard Windows Print dialog box set up to print the current screen. A printer must be connected and setup on the VERDICT unit. If not, the “Add Printer Wizard” opens and guides you through the procedure. Select from the menus as needed.

After using the Scanner, Component Test, and Scope Multimeter to diagnose and locate the source of problem, select **Information** on the Home screen to link to resources that help you fix the problem and get the vehicle back in service (Figure 10-1).



Figure 10-1 Sample Home screen Information button

ShopKey5 software is available as an option for North America. An internet connection is required. When installed, simply tap the Repair information toolbar button to launch the ShopKey5 program. Refer to the on-line help within the ShopKey5 program for additional information.

Selecting Help from the Home screen opens this manual. Use standard Adobe Acrobat navigation and operating procedures to view the manual. Refer to Adobe help for additional information.

11.1 Navigating the Help File

The gesture scrolling feature of VERDICT may not be active when the help file is initially opened due to the default settings of the viewing program. If gesture scrolling is not available, use the following procedure to enable it.



To enable gesture scrolling:

1. Touch and hold pressure on a point in the main viewing area of the screen (right-click) to open the settings menu.

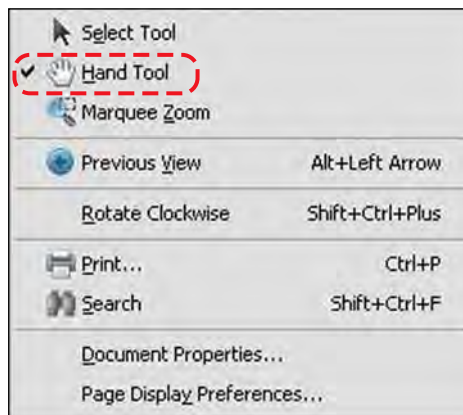


Figure 11-1 Sample settings menu

2. Tap to select **Hand Tool** from the menu. A check mark indicates the selected item.
3. Tap anywhere outside the menu box to close it.

Gesture scrolling should now be active, and you should be able to navigate through the entire file. If you are only able to scroll to the bottom of the page being displayed, the page display preferences need to be adjusted using the following procedure.



To adjust page display preferences:

1. Momentarily touch and hold pressure on a point in the main viewing area of the screen to open the settings menu.



NOTE:

The settings menu does not open until your finger, or the stylus, is lifted off of the touch screen because the “Hand Tool” is active.

2. Tap to select **Page Display Preferences** from the settings menu to open the Preferences dialog box.
3. Use the dropdown menus to adjust the Default Layout and Zoom settings as follows:
 - Page Layout: **Single Page Continuous**
 - Zoom: **Fit Width**

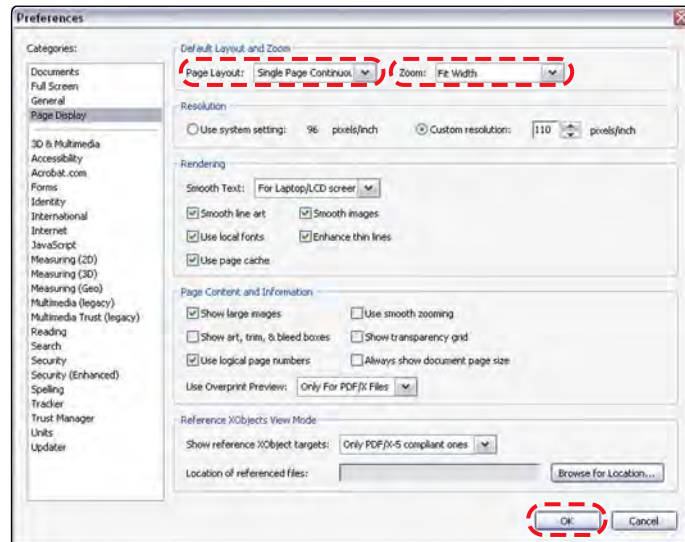


Figure 11-2 Sample settings dialog box

4. Select **OK** to close the dialog box.

11.1.1 Using the VERDICT Hard Keys

The directional arrow and return buttons can also be used to navigate through the help file. The buttons function as follows:

- Right (▶)—advances to the next page
- Left (◀)—returns to the previous page
- Up (▲)—moves up one line at a time
- Down (▼)—moves down one line at a time
- Return—moves down one screen at a time









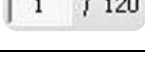


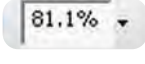


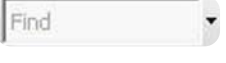
NOTE:

The left and right arrows move the screen focus left and right respectively if the Bookmarks panel is open or if Zoom is set to anything other than Fit Width.

11.1.2 Using the Help Toolbar

A toolbar just below the options buttons can also be used to navigate through the file. Toolbar operations are briefly explained in the table below:

Table 11-1 *Help toolbar buttons*

Name	Button	Description
Print		Sends the document to a printer.
Save		Saves a copy of the Help file.
Workgroup		Allows you to share the file through a network or the internet.
Browser		Launches a web browser
Page Up		Returns to the previous page of the document.
Page Down		Advances to the next page of the document.
Current Page		Shows what page of the document is currently on the screen
Zoom Out		Incrementally decreases screen magnification with each touch.
Zoom In		Incrementally increases screen magnification with each touch.
Magnification		Show screen magnification as a percentage, tap to open a dropdown menu of options.
Fit Width		Resizes the screen image to display the width of the page.
Fit Page		Resizes the screen image to display an entire page.
Search		Allows you to search the document for a specific item. Use the virtual keyboard to enter search criteria.

The scroll bars at the right side and bottom of each panel are used to move up and down and left and right within the main display field. Touch and drag the divider bar between the two panels to resize the panel widths.

Selecting System Settings from the Home screen opens the peripheral manager, which allows you to pair and configure wireless devices to the VERDICT display device.

12.1 Synchronizing Wireless Communications

The S3 Scanner Module is connected wireless to the Display Device so that data is readily available while working anywhere on the vehicle. The M2 Data Acquisition Device is connected wireless to the Display Device so that underhood circuits can be monitored while driving. In order to do this, the modules need to be paired, or synchronized, the first time they are used together. Detailed information about paired modules can be found by selecting System Settings from the Home screen.



To check paired module details:

1. Tap the **System Settings** button on the Home screen.
2. Tap the **Paired Devices** option on the menu.

The paired devices screen opens ([Figure 12-1](#)).

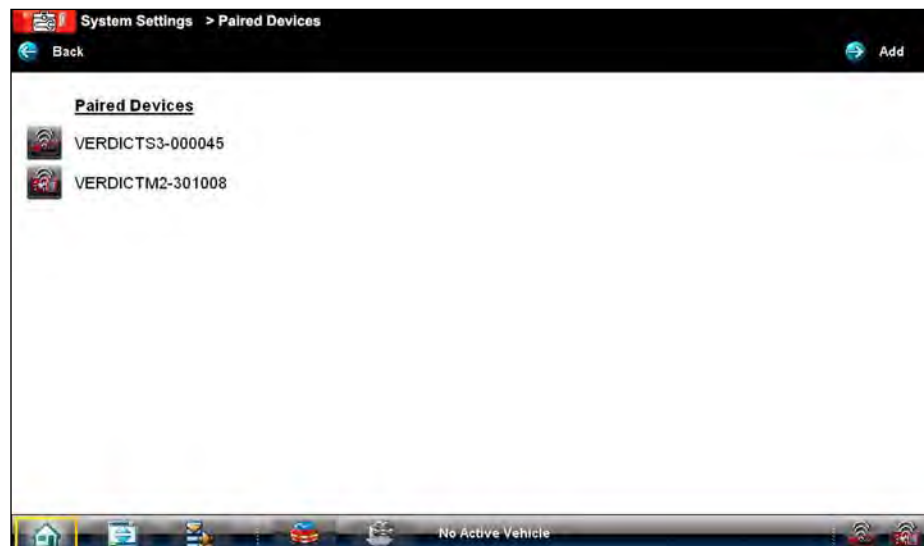


Figure 12-1 Sample Paired Devices screen

The Paired Devices screen shows the type and a partial serial number for all of the modules synchronized to the Display Device, and whether or not there is an active communications link between the units.

The Hardware Status indicators in the lower-right corner of the Home screen provides a quick reference of which modules have been paired to the Display Device ([Table 12-1](#)):

Table 12-1 Hardware Status indicators

Module	Not Paired	Paired
Scanner		
Data Acquisition		

12.1.1 Pairing the S3 Scanner Module

The S3 Scanner Module needs to be either connected to a vehicle or connected to a powered USB port so that it is powered up during the synchronization procedure. Make sure the VERDICT Display Device has a charged battery or is connected to an AC power supply.



To pair the Scanner with the Display Device:

1. Power on the VERDICT Display Device.
2. Connect the 25-pin end of the data cable to the Scanner data cable port.
3. Connect the 16-pin end of the data cable to a live vehicle data link connector (DLC).
The green vehicle power LED should be illuminated.
4. Tap the **System Settings** button on the Home screen of the Display Device.
5. Select **Paired Devices** from the menu.
6. From the Paired Devices screen select **Add** from the toolbar.
7. When prompted select **OK** from the toolbar.

The Display Device searches for compatible wireless devices, then displays the results. The Scanner Module is listed as "VERDICT S3-" plus a partial serial number ([Figure 12-2](#)).



Figure 12-2 Sample Scanner Module selection

8. Tap to select the Scanner module from the search results list.

A search in progress message displays during the pairing procedure (Figure 12-3), the Paired Devices screen (Figure 12-1) displays once the procedure completes.



Figure 12-3 Sample pairing in progress message

9. Tap the **Home** button on the VERDICT toolbar to return to the Home screen.
10. Disconnect the data cable from the vehicle.

The Scanner and Display devices are now synchronized for wireless communication and should automatically recognize each other when both are powered up.

12.1.2 Pairing the M2 Data Acquisition Device

Make sure the M2 Data Acquisition Device and the D7 Display Device have charged batteries, or are connected to an AC power supply.



To pair the Data Acquisition Device with the Display Device:

1. Power on the VERDICT Display Device.
2. Set the M2 rotary switch to the **Remote Functions** position (Figure 12-4).

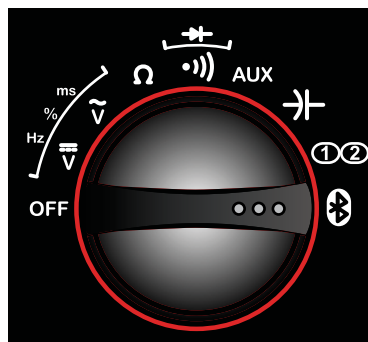


Figure 12-4 Rotary switch Remote functions setting

3. Tap the **System Settings** button on the Home screen of the Display Device.
4. Select **Paired Devices** from the menu.
5. From the Paired Devices menu select **Add** from the toolbar.
6. When prompted select **OK** from the toolbar.

The Display Device searches for compatible wireless devices, then displays the results. The Data Acquisition Device is listed as "VERDICT M2-" plus six digits of the unit's serial number.

7. Tap to select the Data Acquisition Device from the search results list (Figure 12-5).



Figure 12-5 Sample Data Acquisition Device selection

An in progress message displays during the pairing procedure, which takes several seconds. The Paired Devices screen displays once the procedure completes (Figure 12-6).



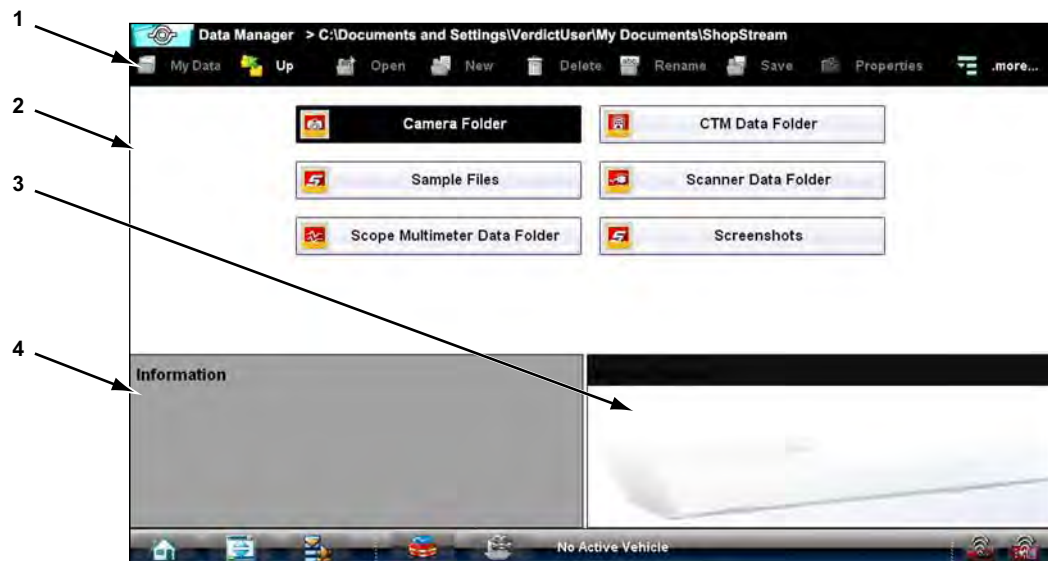
Figure 12-6 Sample Paired Devices screen

8. Tap the **Home** button on the VERDICT toolbar to return to the Home screen.

The Data Manager module is used to store, sort, and review saved files. Most operations are controlled through the toolbar.

13.1 Screen Layout

Select Data Manager on the Module toolbar to open the file system. Use the toolbar at the top of the screen to navigate through the data. The folders panel below the toolbar displays the contents of the Windows “My Documents” folder, which is the Data Manager main screen. The information panel on the lower-left portion of the screen shows a summary of the saved file when available, and the preview panel on the lower right displays an image if the selected file is a graphic.



- 1— Data Manager Toolbar
- 2— Folders Panel
- 3— Information Panel
- 4— Preview Panel

Figure 13-1 Sample Data Manager main screen



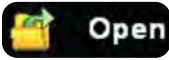

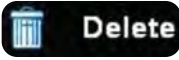
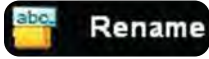

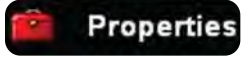
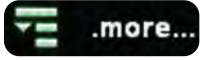
The main screen includes folders for saved files from the various VERDICT modules:

- Camera Folder—contains photographs taken with the built-in camera.
- CTM Data Folder—contains files saved while working in the Component Test module.
- Sample Files—contains an assortment of example saved data files.
- Scanner Data Folder—contains files saved while working in the Scanner module.
- Scope Multimeter Data Folder—contains files saved while working with the Scope Multimeter.
- Screenshots—contains images saved by pressing the “S” button.

13.2 Navigation

Use the toolbar buttons are shown in the table below to navigate through the Data Manager:

Table 13-1 Data Manager toolbar buttons

Name	Button	Description
My Data	 My Data	Returns to the Data Manager main screen.
Up	 Up	Moves the items displayed in the folders panel up one level in the file structure.
Open	 Open	Opens the highlighted folder or file.
New	 New	Creates a new folder.
Delete	 Delete	Moves the highlighted file or folder to the recycling bin.
Rename	 Rename	Opens a dialog box and virtual keyboard for renaming the selected file or folder.
Save	 Save	Saves the selected file.
Properties	 Properties	Opens a dialog box and virtual keyboard for renaming the selected file or folder.
More	 .more...	Opens a menu of additional options.

13.3 Operations

Data Manager operations based on toolbar selections are explained in the following sections.

13.3.1 My Data

The My Data button is a shortcut that quickly returns you to the main Data Manager screen. Tap the button at any time to instantly return. Note the location of the page being viewed is shown near the top of the screen just above the toolbar.

13.3.2 Up

This button moves the items shown in the folders panel of the screen up in the file structure one level at a time. For example; one tap of the Up button when viewing the contents of the Scanner Data Folder returns you to the main screen. A second tap would display the contents of the “My Documents” folder.

13.3.3 Open

The Open button is only active (displays in color) when an item in the folders panel is highlighted.



To open a folder:

1. Highlight the file to open in the folders panel.
2. Tap the **Open** button to load the highlighted file.

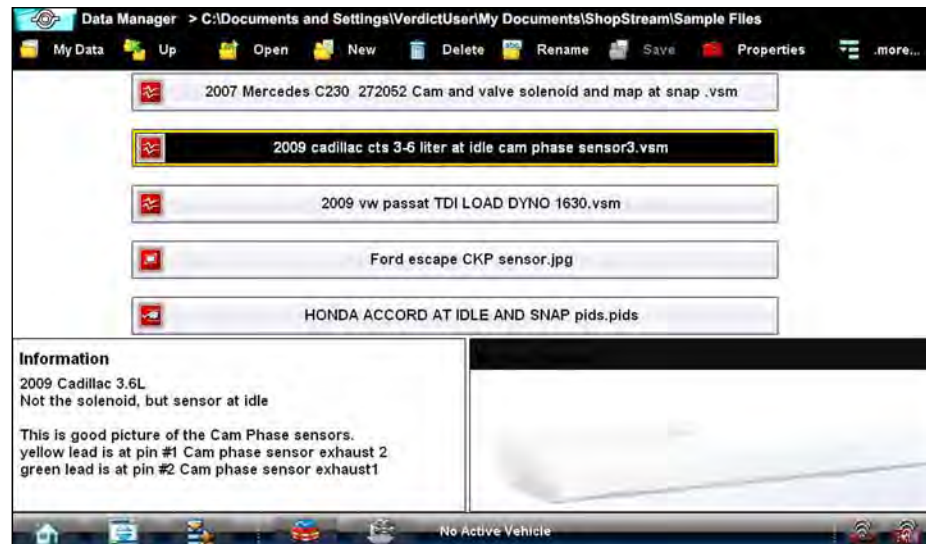


Figure 13-2 Sample open folder showing information

The screen advances and the contents of the open folder are shown in folders panel. Highlight an item in the folders panel and the information or preview displays if available (Figure 13-2).

3. To exit the current folder:
 - Tap **My Data** on the toolbar to return to the main Data Manager screen.
 - Tap **More > Up** on the toolbar to return to the previous page.

13.3.4 New

The New button allows you to create a new folder. This option is only available when the button displays in color.



To create a new folder:

1. Tap the **New** button on the toolbar.

The New Folder Name dialog box opens (Figure 13-3).
2. Touch the entry field on the dialog box to open the virtual keyboard.
3. Type a name for the new folder using the virtual keyboard.
4. Tap the **OK** button to create the new folder and return to the previous page. The Cancel button returns you to the previous page without creating a new folder.



Figure 13-3 Sample New Folder name dialog box

13.3.5 Delete

The Delete button moves folders or items within folders to the Recycling bin. A confirmation displays when a file is selected for deletion. Select Yes to delete the file or No to cancel.



To delete an item:

1. Touch to highlight the item or folder to be deleted.
2. Tap the Delete button on the toolbar.

A confirmation message displays ([Figure 13-4](#)).



Figure 13-4 Sample delete confirmation message

3. Tap **Yes** to delete the selected item and return to the previous page. The No button returns you to the previous page without deleting the selected item.

13.3.6 Rename

The Rename button allows you to change the name of a folder or items within a folder.



To rename an item:

1. Touch to highlight the item or folder to be renamed.
2. Tap the **Rename** button on the toolbar.

The New Name dialog box opens ([Figure 13-3](#)).

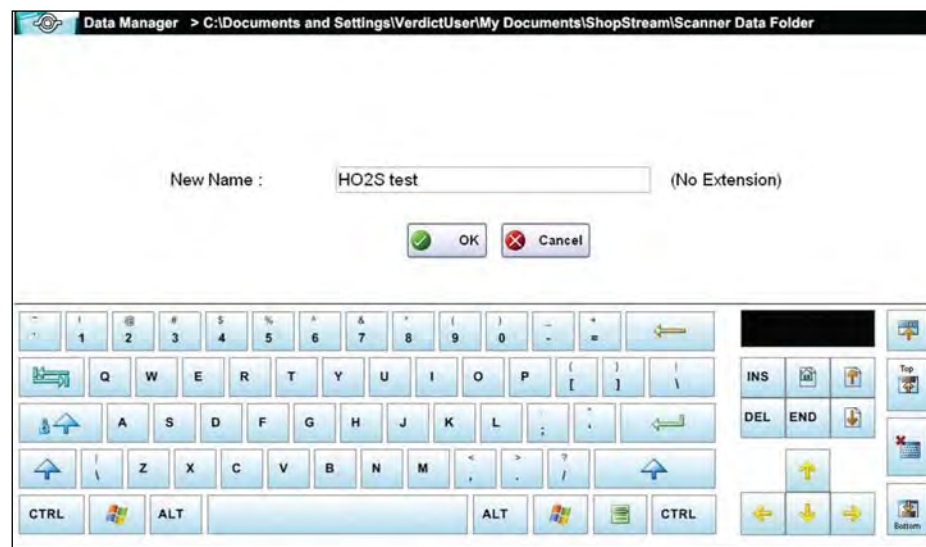


Figure 13-5 Sample new name dialog box

3. Touch the entry field on the dialog box to open the virtual keyboard.
4. Type the new name into the entry field using the virtual keyboard.
5. Tap the **OK** button to change the name and return to the previous page. The Cancel button returns you to the previous page without changing the name.

13.3.7 Save

The Save button is not implemented at this time.

13.3.8 Properties

The Properties button function is the same as the Rename button at this time.

13.3.9 More

Selecting the More button opens a dropdown menu with two options:

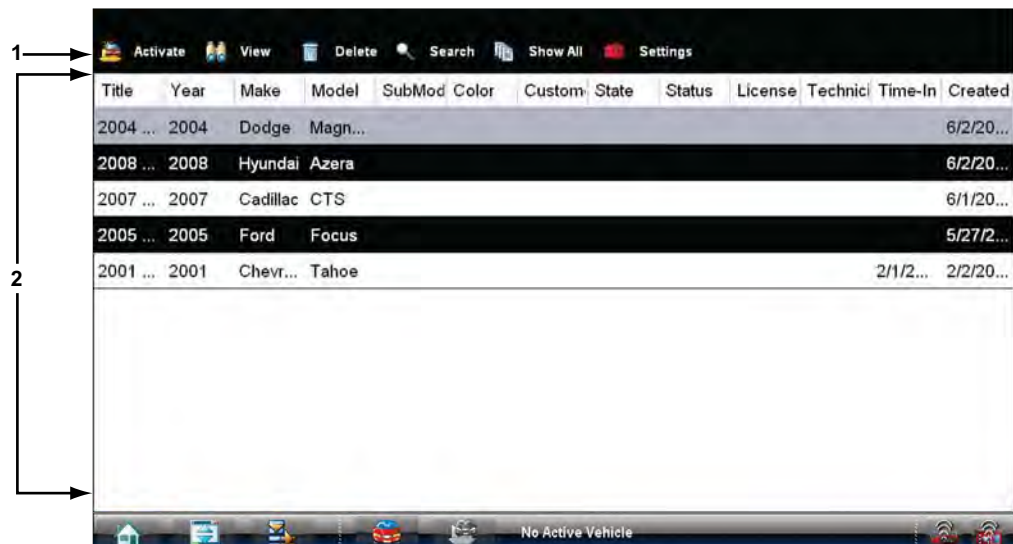
- **Shortcut**—creates a shortcut to the highlighted item on the Data Manager main screen. A confirmation message displays when this option is selected.
- **Email**—opens a new e-mail message with the selected file attached. The display device must have an active e-mail account to use this feature.

The Vehicle History refers to any work in progress, such as a repair order, estimate or invoice, that has customer, vehicle, and repair information for a vehicle in your shop. The Vehicle History is the starting point for using the VERDICT system.

The Scanner and Component Test software get vehicle information from the Vehicle History, and can only start after a Vehicle History is opened.

14.1 Screen Layout

There are two main parts to the Vehicle History screen:



1— Vehicle History Toolbar—lets you manage the vehicle data

2— Main Body—lists all open Vehicle History records

Figure 14-1 Sample Vehicle History screen

14.1.1 Vehicle History Main Body

The main body of the screen lists all of the available Vehicle History items. By default, items are shown in the order in which they are entered. However, you can resort them by any of the categories shown as column headings. You can also resize the individual columns.



To sort Vehicle History items:

1. Tap a category heading.
The listed items resort according to the selected category. A triangle appears alongside the name of the column that was used for the sort.
2. Select the triangle in the heading to reverse the sort order.









To resize a Vehicle History column:

1. Touch the line separating two columns.
A line with arrowheads appears to show the column is ready for resizing.
2. Drag the line left or right to increase or decrease the column width.

14.1.2 Vehicle History Toolbar

The table below gives brief descriptions of the control buttons on the toolbar:

Table 14-1 *Toolbar buttons*

Name	Button	Description
Activate	 Activate	Loads the highlighted vehicle history
View	 View	Opens the worksheet for the currently highlighted vehicle history
Delete	 Delete	Erases the currently highlighted vehicle history
Search	 Search	Opens a window that allows you to locate a particular vehicle history
Show All	 Show All	Available only after a search, use to return to a complete Vehicle History list
Settings	 Settings	Opens a window that allows you configure which fields display on main Vehicle History screen

Activate

Use this button to load an existing vehicle history when servicing a vehicle that you have previously worked on. VERDICT uses the identification characteristics stored in the vehicle history to load the correct database, so you do not need to identify the vehicle to begin testing.



To activate a vehicle:

1. Locate and highlight the desired Vehicle History in the main body of the screen.
2. Tap **Activate** on the Vehicle History toolbar.
The Activate button is removed from the toolbar once a vehicle has been selected.
3. Tap the **Home** button on the VERDICT toolbar.
The VERDICT Home screen displays and with the activated vehicle shown on the toolbar.
4. Select any module button on the Home screen to begin testing.

View

Use this selection to open edit, add notes, and print the work sheet for an existing Vehicle History.



To modify an existing Vehicle History:

1. Highlight the Vehicle History be opened in the main body of the screen.
2. Tap **View** on the Vehicle History toolbar.

The worksheet for the selected vehicle opens, and there are now Back and Save & Close buttons available on the toolbar.

Figure 14-2 Sample vehicle history worksheet



NOTE:

The virtual keyboard automatically opens the first time you touch within one of the data fields.

3. Use the virtual keyboard to enter information in the data fields.
4. Tap **Save & Close** on the toolbar to save the changes you made and return to the Vehicle History screen.

Use the **Back** button on the toolbar to return to the Vehicle History screen without saving the changes you made.

Delete

Use the Delete button to remove unwanted items from the Vehicle History list. Simply highlight the item to remove, then select Delete.

Search and Show All

Selecting Search opens a dialog box that allows you to search Vehicle History items by category (Figure 14-3).

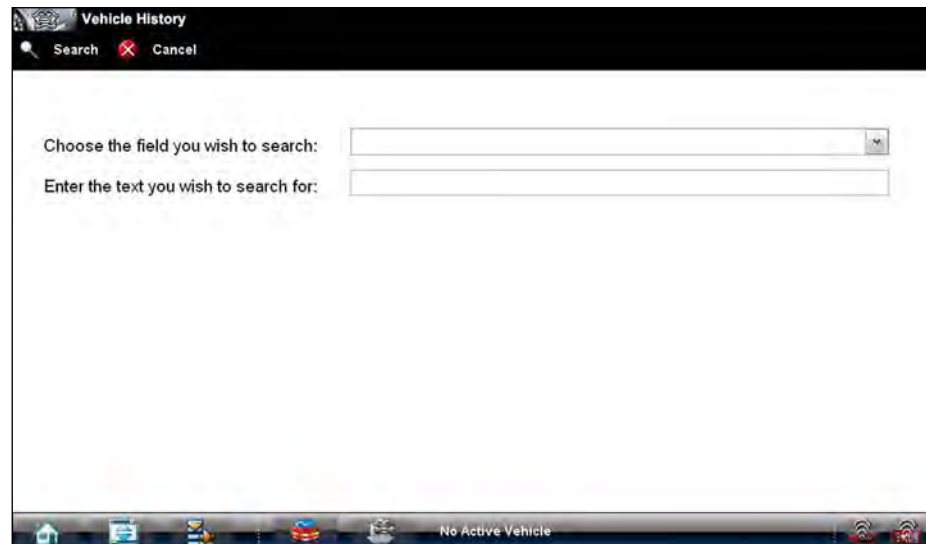


Figure 14-3 Sample Search dialog box



To search:

1. Tap **Search** on the Vehicle History toolbar to open the search window.
2. A dropdown menu allows you to select the field to search:
 - Year
 - Make
 - Model
 - Color
 - Customer
 - License
 - State
 - Technician
3. Use the virtual keyboard to enter search criteria into the text field.
4. Select **Search** to start the search.

The display returns to the Vehicle History screen with only the records fitting the search criteria showing.
5. Tap **Show All** on the toolbar to restore the complete Vehicle History list.

Settings

Use Settings to determine which categories of information display in the main body of the Vehicle History screen. Selecting the Settings button opens a dialog box.

**To change Settings:**

1. Tap **Settings** on the Vehicle History toolbar to open the dialog box.

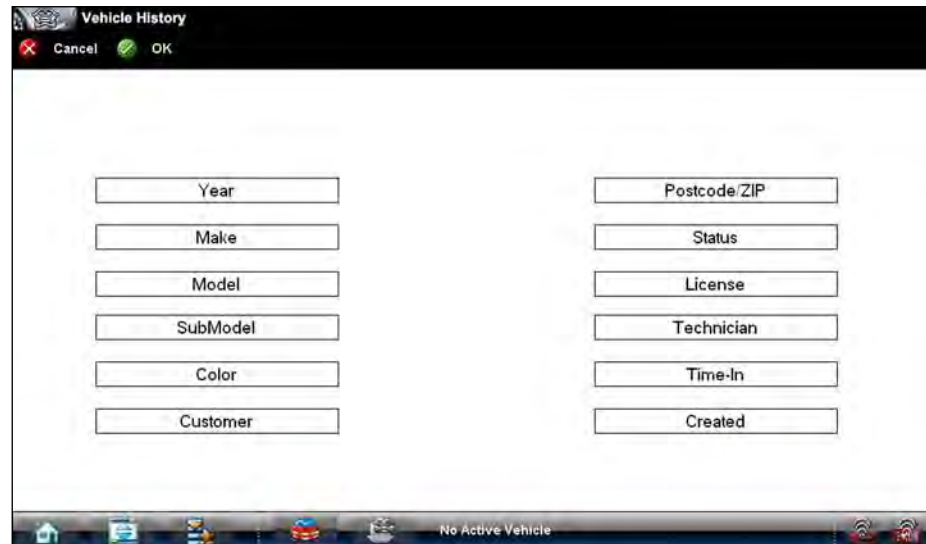


Figure 14-4 Sample Settings dialog box.

2. Tap to highlight the categories that you do not want to display on the main screen, remember:
 - Items that are highlighted do not display
 - Items that are not highlighted display
3. Select **OK** on the toolbar to implement the changes, select **Cancel** to disregard the changes. The dialog box closes and the screen updates. Vehicle History:

14.2 Shop Information

The Shop Information feature allows you to add personalized shop information that can be included on printed data files.

**To access shop information:**

1. Select **Vehicle History** from the Home screen.
2. Tap the **Menu** button on the VERDICT toolbar.
A submenu of options opens.
3. Select **Shop Information** from the menu.
The shop information form opens.
4. Use the virtual keyboard to enter information into the fields.
5. Select **OK** to close the completed form.
The information you entered can now be included a header for printed records.

This section covers how to care for your VERDICT Diagnostic Platform components.

15.1 D7 Display Device

This section covers how to care for your D7 Display Device.

15.1.1 Cleaning the Touch Screen

The touch screen can be cleaned with a soft cloth and alcohol or a mild window cleaner.

IMPORTANT:

Do not use any abrasive cleansers or automotive chemicals on the touch screen.

15.1.2 Calibrating the Touch Screen

The touch screen can be calibrated for accuracy using the PenMount (PM) utility of the unit.



To calibrate the touch screen:

1. From the Windows toolbar select **Start > PenMount Control Panel**.



Figure 15-1 Launching the calibration program

2. In the PM Control Panel; highlight the **PenMount 6000 RS232** and select **Configure**.
3. Select one of two calibration options:

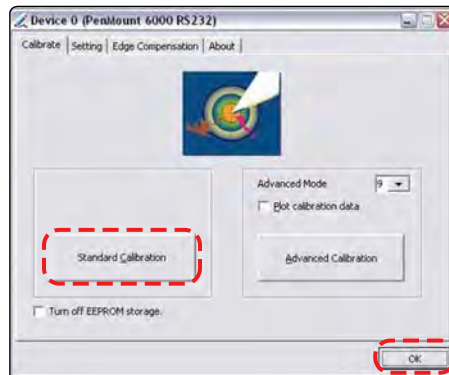


Figure 15-2 Selecting a calibration option

- **Automatic**—uses 5 points on the screen to quickly bring the unit into calibration. You can use your finger to calibrate the screen.
 - **Advanced**—uses 9, 16, or 25 points on the screen to accurately bring the unit into calibration. Use the dropdown menu to select the number of points, a stylus is required to calibrate the screen.
4. Touch and hold the center of each red box that displays in sequence.

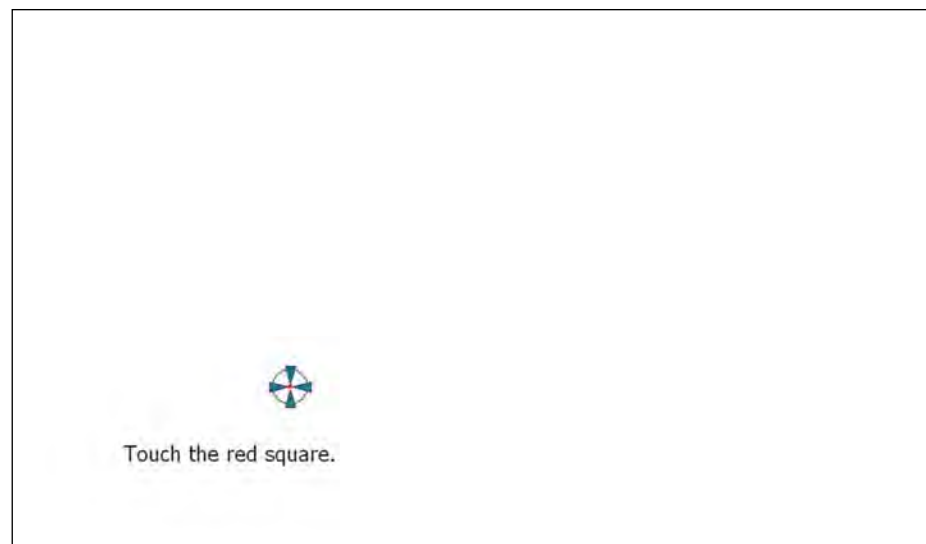


Figure 15-3 Sample calibration target

5. Select **OK** to close the dialog boxes once the calibration is complete.

Extended Desktop Touch Screen Calibration

Special consideration must be given to calibrating the touch screen when the Extended Desktop feature of the D7 Display Device is used with an external monitor and the optional docking cradle. If the standard calibration method does not restore touch screen accuracy to a unit with extended desktop, use one of the procedures that follow.



To calibrate the touch screen without the unit installed in docking cradle:

1. From the Windows toolbar select **Start > Control Panel > Display**.
The Display Properties dialog box opens.
2. From the dialog box select **Settings > Advanced**.
The Default Monitor and Intel Driver dialog box opens.
3. From the dialog box select the **Display Config** tab.
4. From the Display Config tab, select LVDS (clone) CRT from the Display Configuration dropdown menu (Figure 15-4).

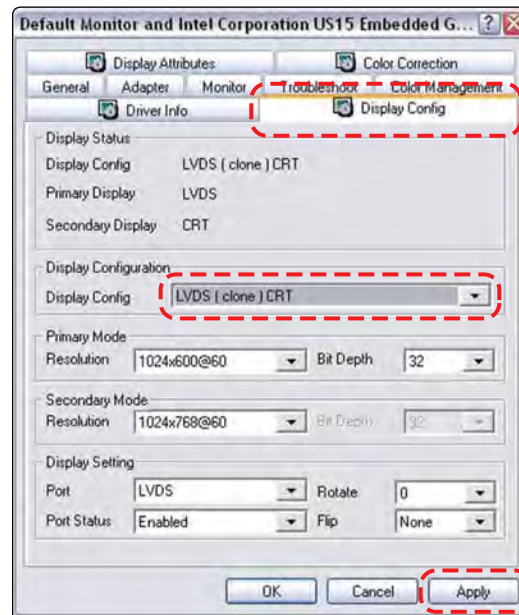


Figure 15-4 Sample Display Config tab

5. Select Apply.
6. Close the dialog boxes and the Control Panel window.
7. Calibrate the touch screen using the standard procedure.



NOTE:

This method disables the extended desktop. The same calibration issue arises if the extended desktop is used again.



To calibrate the touch screen with the unit installed in docking cradle:

1. With the D7 Display Device installed in the docking cradle, connect a USB keyboard and an external monitor.

IMPORTANT:

The Intel Graphics Display Config should be set to “**LVDS (extended) CRT**”, refer to the procedure above to verify or reset the configuration.

2. From the Windows toolbar select **Start > PenMount Control Panel** to open the dialog box.
3. From the dialog box, select the **Multiple Monitors** tab.

4. With the **Multiple Monitor Support** box checked, select the **Map Touch Screens** button (Figure 15-5).

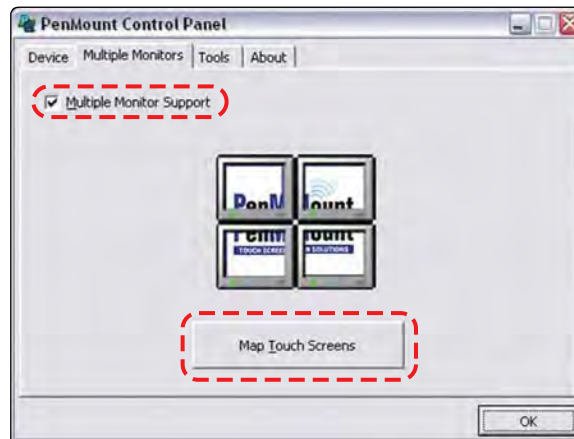


Figure 15-5 Sample Multiple Monitors tab

5. Follow the screen prompts and touch the screen of the D7 Display Device as requested.
6. Type “S” on the USB keyboard to skip for extended display as requested.
7. Select **OK** from the Multiple Monitors tab to close the PenMount Control Panel dialog box.
8. Calibrate the touch screen using the standard procedure.

15.1.3 Cleaning and Inspecting the D7 Display Device

When using the VERDICT Display Device, make sure to do the following:

- Check the housing, wiring, and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the VERDICT Display Device housing, wiring, and connectors clean with a damp cloth.

IMPORTANT:

Do not use any abrasive cleansers or automotive chemicals on the VERDICT Display Device.

15.1.4 Battery Service

Follow all safety guidelines when handling the battery pack.

WARNING



Risk of electric shock.

- **Prior to recycling the battery pack, protect exposed terminals with heavy insulating tape to prevent shorting.**
- **Disconnect all test leads and turn diagnostic tools off before removing the battery pack.**
- **Do not attempt to disassemble the battery or remove any component projecting from or protecting the battery terminals.**
- **Do not expose the unit or battery pack to rain, snow, or wet conditions.**
- **Do not short circuit the battery terminals.**

Electric shock can cause injury.

! WARNING

Risk of explosion.

- **The Lithium battery is factory replaceable only, incorrect replacement or tampering with the battery pack may cause an explosion.**

Explosion can cause death or serious injury.

Battery Safety Guidelines

IMPORTANT:

The battery pack contains no user serviceable components. Tampering with the battery pack terminals or housing will void the product warranty.

Keep the following in mind when using and handling the VERDICT battery pack:

- Do not short circuit battery pack terminals.
- Do not immerse the VERDICT Display Device or battery pack in water, or allow water to enter the unit or battery pack.
- Do not crush, disassemble, or tamper with the battery pack.
- Do not heat the battery pack to over 100°C (212°F), or dispose of it in a fire.
- Do not expose the battery pack to excessive physical shock or vibration.
- Keep the battery pack out of reach of children.
- Do not use a battery pack that appears to have suffered abuse or damage.
- Charge the battery pack in the appropriate charger only.
- Do not use a battery charger that has been modified or damaged.
- Use the battery pack for the specified product only.
- Store the battery pack in a cool, dry, well ventilated area.



NOTE:

The battery pack should be used within a short period of time (about 30 days) after charging to prevent loss of capacity due to self-discharging.

If long-term storage of the battery pack is necessary, it should be stored in a cool, dry, well ventilated place with a 30 to 75 percent state of charge to prevent loss of characteristics.

To prolong the life of your battery, power off the unit or place it into hibernation mode when not in use. The VERDICT display Device has a built in charger that recharges the battery on demand whenever it is connected to a power source.

Replacing the Battery Pack

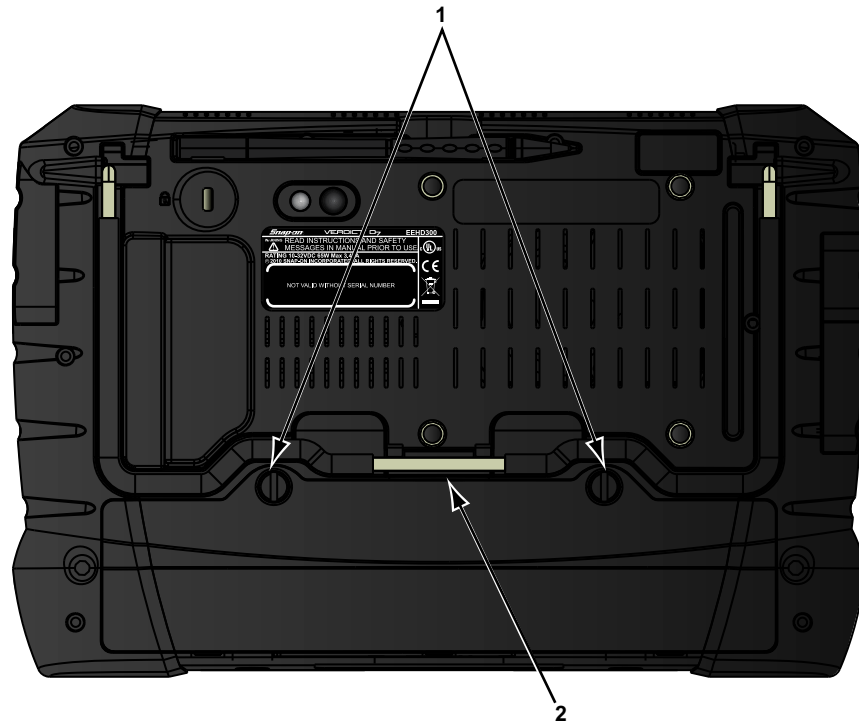
If the battery pack no longer hold a charge, contact your sales representative to order a new one.

IMPORTANT:

Replace the battery pack with original Snap-on replacement parts only.

**To replace the battery pack:**

1. Loosen the two captive screws that secure the battery pack to the back of the unit.
2. Insert a fingernail into the recess at the mid point of the top of the battery pack, then gently raise the battery pack up to release the electrical connector.

**1— Captive Screws****2— Lifting Recess***Figure 15-6 Display Device battery pack replacement*

3. Lift the battery pack clear of the unit.
4. Fit the three tabs on the bottom of the new battery pack into the slots, then rotate the assembly into position.
5. Make sure the battery pack is fully seated.
6. Tighten the two captive screws.

Disposing of the Battery Pack

Always dispose of a lithium-ion battery pack according to local regulations, which vary for different countries and regions. The battery pack, while non-hazardous waste, does contain recyclable materials. If shipping is required, ship the battery pack to a recycling facility in accordance with local, national, and international regulations. For additional information contact:

- North America—Rechargeable Battery Recycling Corporation (RBRC) at <http://www.rbrc.org> or <http://www.call2recycle.org>, or call 1(800) 822-8837 (USA)
- United Kingdom—Electrical Waste Recycling Company at <http://www.electricalwaste.com>

Products bearing the WEEE logo (Figure 15-7) are subject to European Union regulations.



Figure 15-7 sample WEEE logo



NOTE:

Always dispose of materials according to local regulations.

Contact your sales representative for details.

15.1.5 Operating System Restore

Snap-on System Restore is a hard disk drive recovery program that allows you recover the hard disk drive files in the event of a failure. Running the program replaces all of the C drive data with the original factory data. Be aware, all new or modified files on the C drive will be lost.

The directional arrow buttons on the D7 Display Device are used to navigate when performing a system restore. Use the Enter button to make selections.

**To restore the operating system**

1. Power on the D7 Display Device.
2. Wait for the "Press Up Arrow to run Snap-on System Restore" message to display, then Press the **Up Arrow** button.

A progress indicator displays while the program loads.

3. Select **OK** from the confirmation message.

A progress indicator displays while the files are being restored.

4. Select **OK** from the confirmation message.

The D7 Display Device shuts down, then reboots and the system recovery portion of the operation begins. Follow any on-screen prompts.

The D7 Display Device shuts down and reboots a second time. When the VERDICT Home screen displays, the procedure is complete and the D7 Display Device is ready for use.

15.2 S3 Scanner Module

This section covers how to care for your VERDICT S3 Scanner module.

15.2.1 Cleaning and Inspecting the S3 Scanner Module

When using the VERDICT S3 Scanner, make sure to do the following:

- Check the housing, wiring, and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the housing, wiring, and connectors clean with a slightly damp cloth.

IMPORTANT:

Do not use any abrasive cleansers or automotive chemicals on the Scanner module.

15.2.2 Replacing the Protective Handgrip

The soft protective handgrip that covers the outer edges of the Scanner is easily replaced should it become worn or damaged. Contact your sales representative for replacement parts.

**To replace the protective handgrip:**

1. Disconnect the data cable, and any other cables, if attached to the Scanner.
2. From the bottom of the Scanner, gently lift up and out on one side of the handgrip to free it from Scanner housing.
3. Repeat step 2 to loosen the other side of the handgrip.
4. Lift the handgrip off of the Scanner housing.



NOTE:

The handgrip tapers toward the front of the Scanner housing. Make sure the replacement handgrip is correctly oriented before attempting to install it.

5. Fit the new handgrip over the top, data cable end, of the Scanner housing.
6. With your fingers, work the new handgrip onto the Scanner housing from top to bottom. Make sure the tabs on the handgrip fit into the grooves on the housing.

15.3 M2 Data Acquisition Device

This section covers how to care for your M2 Data Acquisition Device.

15.3.1 Cleaning and Inspecting the M2 Data Acquisition Device

When using the VERDICT M2, make sure to do the following:

- Check the housing, wiring, and connectors for dirt and damage before and after each use.
- At the end of each work day, wipe the housing, wiring, and connectors clean with a slightly damp cloth.

IMPORTANT:

Do not use any abrasive cleansers or automotive chemicals to clean the unit, cables, or probes.

15.3.2 Replacing the Battery Pack

If the battery pack no longer hold a charge, contact your sales representative to order a new one.

IMPORTANT:

The battery pack contains no user serviceable components. Tampering with the battery pack terminals or housing will void the product warranty.

Replace the battery pack with the exact replacement rechargeable nickel-metal hydride (Ni-MH) type battery only. Do not attempt to use standard (lead/zinc) batteries as they do not provide sufficient power to operate the Data Acquisition Device, and may leak and damage the tool.

⚠ WARNING

Risk of electric shock.

- **Prior to recycling the battery pack, protect exposed terminals with heavy insulating tape to prevent shorting.**
- **Disconnect all test leads and turn diagnostic tools off before removing the battery pack.**
- **Do not attempt to disassemble the battery or remove any component projecting from or protecting the battery terminals.**
- **Do not expose the unit or battery pack to rain, snow, or wet conditions.**
- **Do not short circuit the battery terminals.**

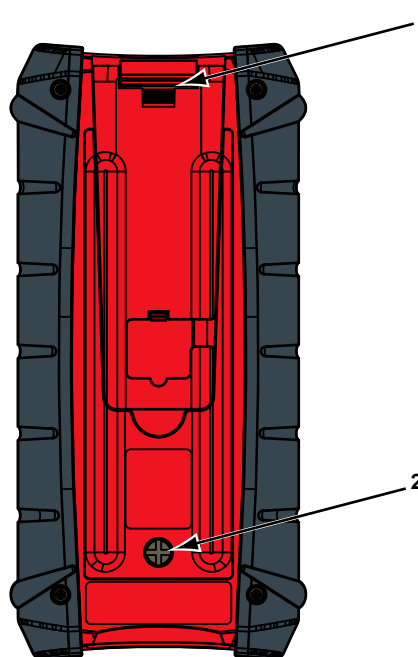
Electric shock can cause injury.

IMPORTANT:

Be aware of all applicable safety considerations when replacing, handling, and recycling batteries. Refer to ["Battery Safety Guidelines," on page 130](#) for details.

**To replace the battery pack:**

1. Press to release the hanger catch on the back of the M2 unit ([Figure 15-8](#)), then swing the hanger up (180°) so that it is fully extended.



1— Hanger Catch

2— Captive Screw

Figure 15-8 M2 unit battery pack replacement

2. Loosen the captive screw that secures the battery cover ([Figure 15-8](#)).
3. Remove the battery cover.

4. Remove the battery pack from the M2 unit housing to access the electrical connector.
5. Separate the battery pack electrical connector.
6. Connect the new battery pack electrical connector to the M2 unit.
7. Fit the battery into the battery compartment.
8. Fit the battery compartment cover.
9. Tighten the captive screw and fold down the hanger.

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PURPOSE FOR WHICH WE USE AND DISCLOSE PERSONAL INFORMATION We use and disclose Personal Information obtained when you purchase the product/software and agree to provide this information to the Snap-on Franchise.

We also use Personal Information to communicate with you, for example, to answer the e-mail and correspondence we receive, to confirm your order, to send more information about becoming a dealer, to send renewal notices, and to notify you of important changes in the functionality of the Software or other notices related to the handling of your Personal Information.

We may use Personal Information to make recommendations for additional products or special offers, and to provide you with updates on new products that we believe may be of interest to you, in situations where you expressly request such communications.

From time to time, we may share certain Personal Information with select third parties including other Snap-on affiliates and independent Snap-on dealers in your area to enable them to offer products or services that may be of interest to you. If you do not want us to share such Personal Information in the future, please contact us by using our information below and we will take reasonable measures to avoid sharing such information in the future. Please note that such third parties are usually independent from Snap-on, and if you wish to stop all communications from such parties, you will need to address such issues with the third parties directly.

We may disclose Personal Information in response to legal process or when we believe in good faith that the law requires it, for example, in response to a court order, subpoena or a law enforcement agency's request. We also reserve the right to disclose Personal Information to protect the security of the Software, to protect ourselves and our affiliated companies against liability, and/or in connection with any sale, assignment, or other transfer of all or a part of our business.

We may share Personal Information with our consultants or service providers to help us serve you better. We also contract other companies and individuals (collectively "Suppliers") to perform functions on our behalf, including without limitation, fulfilling and processing orders, handling shipping and returns, sending communications to you, and providing customer services. We require

the Suppliers to agree to abide by Snap-on's privacy policy and only use your Personal Information, only until payment for your order is processed, and only to the extent necessary to perform their functions, and may not use it for any other purpose.

We will not use or share the Personal Information provided to us in the Software in ways unrelated to the ones described above without first providing you an opportunity to opt out or otherwise prohibit such unrelated uses.

CUSTOMIZATION AND AGGREGATE DATA We use non-identifying and aggregate information to better design our Software and gather information for product management and development at Snap-on. For example, we may tell our sales and marketing staff that X number of individuals using the Software, or that Y number of software licenses were ordered during a particular time period, but we would not disclose anything that could be used to identify those individuals. This aggregate information may also be shared with Snap-on's affiliates and independent dealers.

CHILDREN'S PRIVACY Snap-on has no intention of collecting personal information from children in this Software.

HOW YOU CAN ACCESS OR CORRECT YOUR INFORMATION If you are a registered user of the Software, you can access and correct certain Personal Data that we collect through the Software and maintain by using the contact information below. You may also contact us using the information below to ask us to remove your Personal Information from our records, electronic or otherwise. However, we will need to maintain certain Personal Information about your product purchases in our records for purposes such as warranty and product information. We will usually be glad to update your information, but we reserve the right to use Personal Information obtained previously to verify your identity, administer our warranty program, or to take other actions that we believe are appropriate.

COLLECTION OF PERSONAL INFORMATION BY THIRD PARTIES Sometimes we may offer promotions or specials that are sponsored by or co-sponsored with identified third parties. By virtue of their sponsorship, these third parties may obtain Personal Information that you submit to participate in the promotion or special. Snap-on has no control over the third-party sponsors' use of this information. We will notify you at the time of requesting Personal Information if third-party sponsors will obtain such information, and obtain your express consent for such disclosures.

CHANGES TO THE POLICY Our privacy practices are subject to change. We reserve the right to change this policy from time to time in our sole discretion. Please review this policy before you submit additional Personal Information via the Software. All revisions to this Privacy Policy will be communicated to you through updates to the License Agreement. Your continued use of the Software constitutes acceptance of such changes in the Privacy Policy, except where further steps are required by applicable law.

FOREIGN USERS NOTICES Please contact us at the address below to obtain Privacy Policy information for your country.

HOW TO CONTACT US Please feel free to contact us with any comments, questions, or suggestions you may have regarding the information practices described in this Privacy Policy. Please also contact us to report any known or suspected privacy or security breaches.

You may contact us at:

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